

THE BIOLOGIST

A Quarterly Journal Promoting Research
Interest in the Biological Sciences

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1954-1955

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THE BIOLOGIST

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TWO ZOOLOGISTS IN MEXICO

by David Causey

University of Arkansas

We spent a little over a month in Mexico last summer (1954), and being about to go again, offer a few recollections. The primary purposes were collecting millipeds for Mrs. Causey and parasitic copepods from fish for me. The trip was made in our everlasting 1940 Chevie. The expedition had a small grant from my dean's travel fund, and the rest of the expense was supported by the Causey Foundation, a non-profit organization which is always in the red. The number of copepods obtained was very disappointing, but the millipeds were reasonably plentiful. The Mexicans just don't fish on the same scale as we do on our share of the Gulf Coast, and the shrimpers are fewer and don't bring in the trash fish. The one tarpon tournament we waited out produced two fish in the course of three days, one about as big as those caught every fifteen minutes at Port Aransas, Texas, and the other was the smallest tarpon I've seen thus far.

We went into Mexico at Matamoros, armed with birth certificates, vac-

cination certificates, car papers, a letter from Senator Fulbright and another from the Brownsville consul; all I lacked was our marriage certificate, but no one glancing at the two of us has ever doubted my marital status. Matamoros is a typical Mexican border town so far as I know, full of cheap goods and annoying people, especially the brats who climb on your car, run ahead of you, and in general make you wish you were Elisha with some spare she-bears! We had been assured by a most beautiful Mexican senorita that the road on to Victoria was all right, and we were glad to get on the highway and leave Matamoros behind. The gladness didn't last. That was the worst road I've been on, worn out, and with so many chuck holes from washpan to bathtub size that you couldn't dodge them. Huge buses and occasionally a truck stagger by. Later we decided that 25 per cent of the Mexican population is in buses at any particular moment. The road was being rebuilt at the Victoria end, and the temptation to ignore road blocks

and go on the new stretches was met with the most courteous treatment by the road crews, who showed us easy ways back to the detours with smiles and understanding. Our firm rule of no night driving was broken that first day, and we reached Cd. Victoria about 9:30 and felt that the waiter in the restaurant wasn't exaggerating when he said we deserved a medal for completing the trip.

Northern Mexico is a desert, as is southern Texas, and unless you love deserts there isn't much to get excited about. Where irrigation is possible they grow cotton, where it isn't, cattle. It is poor and hopeless without water, a garden of Eden with it, as Americans have shown on their side of the Rio Grande. Victoria, on the edge of the desert, is a delightful little place. I left my first pair of pajamas there, and also locked the keys in the car that night. Next morning I fished them out with a hook made out of a coat hanger, with much approval from my audience, whose eyes sparkled when I mentioned I was a "gringo loco!" (How true! Ed.)

We went down the Pan American highway to Cd. Mante, and left it to drive eastward to the Gulf and to Tampico. The most interesting feature along the way was a huge volcanic core standing up in mute evidence of where a fine volcanic cone must have been long ago. The road was good, the bridges good, and being human, we soon forgot the Matamoros road and thoroughly enjoyed this one. We reached Tampico early in the afternoon, put up at a hotel and next day moved out on the beach where the seashore, the sea breezes, and the romantic setting made us feel younger. Tampico lost much of its commercial glory when the oil men left, and while one still sees American and English businessmen, it is evident that the Mexicans are recovering the city. There is a fine jetty for fishing, but little fishing was being done from it. The few shrimpers along the docks

had nothing for us, and we didn't find fishing boats with fish. A visit to the markets and attempts to examine the fish offered for sale brought disapproving looks and that delightful finger shaking which requires no translation. We got a few copepods before this happened. Here we first encountered what turned out to be a too general custom—so many of the fish had the gills removed and that left them useless for our purposes.

It took several delightful days to convince us that we weren't going to see many fish, and for us to move on. Although the maps we had didn't show them, there are perfectly satisfactory roads along the Mexican coast south of Tampico—all the way to the South Pole, so far as I know. This coastal area is neither tropical rain forest nor savannah, but an area of low shrubs and scrubby trees. I suspect it is largely overgrazed grasslands being taken over by woody plants. Somewhere along the way we failed to follow the buses and so got on to a road nearly built, and had to drive for miles and miles through loose gravel. The last car we stopped to ask for directions had a romantic young fellow with snapping eyes who assured Mrs. Causey (I'm known as that good looking, silent man in Mexico!) we were heading the right way, and ended the explanation with a smile and the affectionate term "little love," which made the road smooth and beautiful for one of us. We went through Tuxpan and put up at a motel on the river. Here Mrs. Causey had her first and only Waterloo with her Spanish, the proprietor not choosing to understand her. We ate under mango trees, slept well, and after breakfast the next morning moved to a hotel in Tuxpan where they understood Spanish.

Tuxpan, also, is reverting to the good old days and ways since the oil expropriation. We spent nearly a week there, partly because it was so delightful, partly because we wanted to go to the fishing village of Tami-

ahua, and lastly, because a fishing tournament was coming up. We found a few copepods on fish in the market but soon wore out our welcome. Our examining the fish seemed to arouse suspicion and we just weren't welcome a second time, not even when we offered to pay for the privilege of looking at the fish. I've found that along our American Gulf Coast it is well to explain that we aren't public health men, who seem to be as low socially as game wardens are in some parts of Arkansas. Rain kept us from Tami-ahua for several days because the roads became impassable. When we got there we found the same fish as were in the market at Tuxpan, in fact those we had looked at came from Tami-ahua! Thanks to a letter from the Tuxpan bank president to the Tami-ahua jefe, we were most kindly received. As indicated earlier, the Tuxpan Tarpon Tournament was a flop this particular time so far as our seeing fish went, but we did have a fine ride on the river with two American business men from Mexico City. We saw jungle along the river's shores, oysters on the roots of mangrove trees, crabs, water birds, etc., but no fish.

We left Tuxpan reluctantly, the dirty, age old market which is to be replaced, the old, old church with its Greek inscription I never quite figured out, the garlic flavored food, the river and its traffic always moving, the nice people — there are many pleasant memories. The trip southward from Tuxpan to Veracruz was all one could ask. Ferrying the river, one follows the coast to Nautla, about a third of the distance, and there the muddy gulf water suddenly turns blue. Here one is sprayed for hoof and mouth disease contamination, ferries a river and turns inland into the tropical rain forest area, along the highway a land of coconut palms and such tropical fruits as bananas, pineapples, mangos, etc. in great plantations. Higher are the coffee plantings. On both sides of Jalapa we encountered religious festivals. Shrines along the road, some-

times of beautiful ceramic structure, were decorated with flowers and sometimes electrically lighted. We met processions carrying the image of the Virgin in several places. At one place we stopped to help with a rain or corn dance. There were a half dozen dancers led by a man in a mask and wearing a fox skin over his shoulders. The faces of the audience showed it was a serious matter.

Apparently Jalapa has only one hotel for Americans. We went the wrong way over so many of its streets — almost all Mexican streets are named *No Transito* — that at one time an army major guided us until we couldn't go wrong, but we did, and finally a traffic policeman abandoned his little pedestal and had a big time taking us to the hotel, hailing his fellow officer with joy and details as we went by. The Hotel Salmones was as magnificent as the Hotel Inglaterra had been in Tampico, and we dined in the state we'd like to become accustomed to. Jalapa would be worth more time than just overnight. There is a grand old cathedral, mellowed by time and the Mexican sun.

Next morning below Jalapa we found a spot where millipeds could be picked up by the handful—I suppose we gathered a pint of them. We never found another place as good. Veracruz it the capital of the tierra caliente, where the thermometer stayed in the low nineties and a sea breeze blew soothingly. It was by no means hot according to Arkansas standards! Veracruz was all one could ask, except for copepods. Cortez landed here, it is the oldest Mexican City, and is both very modern and Mexican. We found a few fish and some copepods. Best of all was an island in the bay, the Isle of Sacrifice, with a coral reef about it. The shores of the island were the finest collecting grounds for marine invertebrates we have ever seen. We were taken out to it by a Mexican fisherman who said he had been treated so nicely in the States that he wouldn't charge us—we compromised on the

cost of the gas. Knowing how we treat Mexicans I still wonder where he had been! Anyway, we wandered about the Isle of Sacrifice with a motley crew of helpers—fishermen and youngsters, and chose what we wanted to put in our bucket. There were corals and sea anemones, sponges and polychaetes, gastropods including green seahares, starfish and brittle stars, sea urchins (including a long spined one regarded as poisonous), big sea cucumbers and balanoglossids, crabs and crabs and crabs—we named them and our collectors went and got them for us! One could spend weeks on that little island and we're going back again this summer!

Our friendly fisherman didn't smoke and he didn't drink beer. I asked him if he had no bad habits. Somewhat hesitantly he admitted he had one—women! He claimed to have four wives and four sets of children. I thought that over for a moment and suddenly asked him what the priest thought of it. He laughed until he cried, then explained that each wife was in a different town, and each town had a different priest, and so they didn't know anything about it. Then he demanded to know how many wives I had, charging me to remember that St. Peter was listening, and that I'd better tell the truth. So was my wife, and I had to admit, shamefacedly, that I had only one. Our little audience seemed to think that very funny. My Spanish was not adequate to maintain that living with my wife isn't any joke.

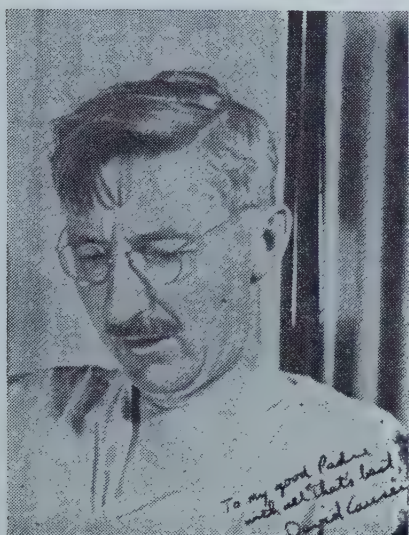
We had planned to go to Yucatan, but fish were so scarce and copepods so few we decided it would be just for the trip. So after a most delightful week in a very modern city, we started for Mexico City. The great snow-capped volcano of Orizaba soon appeared and stayed in view for hours, an interesting sight in the tropics. Soon we were in coffee country, and at Fortin we stopped in what was a natural botanical garden of tropical plants. I was especially interested in

the epiphytes because some are parasitic. The area was well supplied with millipeds and we soon had the gardeners gathering them, or at least uncovering them for us. We're going back to Fortin also! Next night at Pueblo—we spent three days in getting from Veracruz to Mexico City, an ordinary day's trip if you don't stop to hunt millipeds at likely spots.

Mexico City was old stuff to us—we honeymooned there years ago during the days of the conquest and of Cortes. This time the president came out with his troops to meet us, but got mixed up and rode away with Emperor Haile Selassie instead. We saw the new University instead of the bullfight—next day the Emperor said that the Mexicans go to a lot of trouble to kill a bull—the National Museum, and of course the great Cathedral. One walks with history in the Zocalo. We heard the National Symphony at the Fine Arts Palace one time, saw a Spanish dancer a long way from arthritis another time. We hadn't planned to visit Mexico City, in fact we didn't plan to leave the coast, and we lacked clothes suitably warm for the altitude. We looked like tramps, second rate ones, and we stood out among the mink coats and the dress suits. I told people we met that I was Dr. Anselm M. Keefe from West De Pere, Wisconsin, so they wouldn't think people from Arkansas were peculiar. The Arkansas license tag on the car was explained by my admitting that the car was stolen. (Probably. Ed.)

Home by way of the Pan American Highway—Valles, Jacala, where we flushed the toilet twice and had no more water until morning, but had half the town out gathering or looking for millipeds, Victoria, where I reclaimed a pair of pyjamas, and on to Reynosa. Two flats, one going into Mexico, one coming out, and a bit of motor heating on a ten thousand-foot mountain pass. A big argument with the Mexican customs men about a car paper, he maintaining I couldn't

The Author



... no one doubted his marital status!

have got into Mexico without getting it, and that I wasn't going to get out until I produced it, and me positive I'd never seen such a document. Mrs. Causey came to the rescue, found the document in my brief case where I'd looked twice, then it was all smiles and brotherly love.

To conclude, the most interesting part of the trip was the contact with the Mexican people. Where relatively untouched by contact with tourists (American) they are simply grand — kind, courteous, friendly and helpful. Again and again, when we stopped in some desolate mountain area, with not a house in sight, and began collecting millipeds, we were startled to find one or more Mexicans silently watching us — I've begun to consider the

theory of spontaneous generation — and after we showed them what we wanted, they joined in the search and helped a great deal. Their country is one of vivid contrasts, and this is not the first time that observation has been made. At Veracruz we saw a Cris Craft cruiser of shining mahogany and next to it a pirogue used for fishing. There are homes and hotels as fine as any we have, and there are cane huts with thatched roofs and dirt floors. There are a few fine cars and many burros, tractors in some fields and yokes of oxen in others. Human labor is still the cheapest thing in Mexico. One's back ached in sympathy when one saw the loads being carried on or off the boats, or down the streets. Minor perhaps, were the ingenious ways of handling a pig—in a poke, dragged on a leash, tied to a pole; one I saw was rigged up so it was carried like a suitcase. The handwork, especially in ceramics and in silver, is arrested beauty. The markets are still of great interest to anyone who likes to make things or to see them made—leather work, sandals, trinkets and costume jewelry. We felt that great progress has been made since our first visit; one sees schools everywhere, and we talked with many who showed the results of the schools. Life is still hard for the many, but we found fewer beggars in Mexico City, fewer of the sidewalk merchants. The only annoyance was at the Pemex filling stations—they have more ways of cheating than a dog has fleas; they short you on the volume of gas you buy, they try to confuse you about the price, and they often have your bill made out before you drive up and stop. Some are honest, of course, but they stand out in one's memory! And we're going to give them another chance, just as soon as June gets here!

ALBINISM

by Sister Mary Ellen O'Hanlon, O.P.

Sinsinawa, Wis.

Albinism, as the term indicates, applies to the absence of color where certain pigments are normally present in organs or parts of organs of biological species. Albinism ranks among some of the serious inherited defects which have appeared from time to time in a low percentage of many kinds of organisms. Such defects are generally attributed to mutations or changes in the genes and are thus passed on from parents to offspring.

Albinism may be total or only partial. Total albinism is the complete absence of pigmentation in organs which, because of this defect, are functionally imperfect. These albino organisms at the same time seem to carry all of the genes for the full pigmentation for which they are the factors; but they lack the so-called activating genes which make the genes for pigment function. Only one gene of what seems to be a single pair of these activating genes is necessary to make the genes for pigment click. But, if owing to mutations, both of these activating genes are non-functional, the effect produced is the condition we call albinism.

*Total Absence of Color Not Always
Albinism*

Total albinism must not be confused with a total lack of color where this is ordinarily or frequently present, if such a lack of pigment is not a defect, that is, in the sense that it is not detrimental to the good of the organism as a whole. Such lack of color therefore is not albinism according to the definition as genetically accepted. It is important, therefore, to

keep in mind just what albinism is not as well as what it is. Among animals, for example, such as certain birds of white plumage, or white-coated mammals, such as the horse or certain races of cats, these white varieties are not albinos simply because of their white body covers *per se*. True albinism is a defect and, as such, extends to the eyes of such animals. That is to say, pigment is lacking where it should normally be as a necessary factor in some physiological function. However, true albinism may and does appear in individuals among these normal white races.

The same principle applies to certain species of plants in which some of their organs, such as floral leaves or showy bracts, generally bear pigments, such as anthocyanins or anthoxanthins. A white violet, although somewhat of an anomaly, is not, strictly speaking, an albino flower and certainly still less is the plant which produces it an albino plant. The same may be said of the white rose or the white chrysanthemum. Some of the flower parts of these plants are more generally colored, most often according to their significant generic names. But if these flowers lack the pigments found in typical specimens, they are not for that reason, defective and should not be called albinos according to the term as defined above.

Here we might recall the two white-flowering varieties of the sweet pea, which when crossed produce hybrid plants which bear highly colored flowers. Obviously, in the two types of white-flowering plants each carries its particular variety of genes which, when together in the same nuclear complex, interact to produce pigments,

which neither type alone was able to produce.

A similar case of the interaction of genes for pigments is demonstrated in some strains of maize as shown in the color of their kernels. None such genes, of course, whether in the right combination to produce color or not, may be considered defective in any physiological sense. Therefore the whiteness of the flowers of certain strains of the sweet pea and the white kernels of maize are not albinic in the genetical sense of the term.

Another type of plant, one which is completely colorless is the ghost plant or Indian pipe (*Monotropa uniflora* L.). Its chlorophyllous relatives, the cranberries and blueberries and others of the Heath family develop the chlorophyll complex which is natural to the typical green plant. Because of this, these plants are nutritionally independent while their close relative, the Indian pipe, is what is known as a dependent plant. It is able to survive nevertheless in spite of the absence of chlorophyll through its saprophytic habit and cannot therefore be considered defective. The theory is that in the evolutionary process this plant, and a relatively few other seed plants, lost the power to develop chlorophyll and consequently must live as parasites or saprophytes. If so, by the same token, they must also have "found" something with which to compensate for this serious lack!

Albinism in the Animal Kingdom

Albinism probably runs the complete gamut from the simplest animals which bear pigment in their body covers, such as the crayfish, up through all types of mammals, including man. As in man, this inherited defect is attended with certain handicaps which are well known. Albinos among flocks and herds of normal animals, are probably the first to be captured or killed. This is because they are generally more conspicuous and usually have poor vision.

Albinism in Man

Complete albinism in man is a condition in which no pigment develops in the hair, skin or eyes. It is therefore a rather serious defect and is inherited as a Mendelian recessive. It seems that this single pair of activating genes is concerned with the control of the action of all of the genes for pigment, whether in the hair, the skin, or the eyes. When both of these activating genes are absent in the nuclear complex, the individual is an albino. Persons who carry but one of the activating genes of the normal pair, are phenotypically normal but will pass on the defective gene, on an average, to half of their children. The albinic individual suffers the psychological effect of being "different." Besides this his vision is imperfect and the lack of pigment in the skin gives him no protection from the actinic rays of the sun.

Albinism in Plants

Albinism in maize, sorghum, timothy, barley, cotton, pinto beans, and cucurbits is well known. Probably albinism exists in all the major crop plants and in wild and uncultivated plants as well. Unlike total albinism in animals and partial albinism in plants, complete or total albinism in chlorophyll-bearing plants is a lethal character; for the chlorophyll pigments of all typical plants are not merely a protection or a greater perfection but are really the stuff upon which the plant depends for the manufacture of its food. The young albino seedling therefore dies as soon as it has used up the food which was stored in the seed, whether the latter was in the form of endosperm or in the cotyledons. Although albino seedlings are by no means rare inasmuch as probably most species produce their small quota of them, they are so shortlived that no doubt many of them die before anyone sees them. This must be especially true of wild plants. Total albinism must be distinguished from

partial albinism, a condition in which the normal pigmentation fails to develop fully or in parts only of organs which generally bear pigment.

Many seed plants, such as the so-called silver leaf geranium, the striped leaf varieties of some of the day lilies, also certain strains of the English ivy, bear leaves which are partially white, occasionally individual leaves which are totally white, in the latter. Such plants therefore are partially albinic but evidently the origin of their abnormality must differ essentially from that of the total albino.

In a recent paper in the *BOTANICAL GAZETTE* (December 1949, Vol. 111:2, pp. 123-129), Drew Schwartz discusses the chlorophyll mutants in maize and found chlorophyll deficiencies ranging from plants that were pale green and therefore viable to the completely white lethal types.

Albinism in a Fern Gametophyte

Some years ago, Dr. W. N. Steil of Marquette University found several prothalli among his cultures which showed considerable areas of colorless cells. These were cases of partial albinism. It seems that in the course of development of these fern gametophytes, some of the chloroplasts discontinued to divide and thus there developed certain areas in which the cells were all colorless. Whether the failure of certain chloroplasts to divide is owing to a nuclear or a cytoplasmic mutation seems difficult to determine. It seems certain however that in such cases of partial albinism, the defect owes its existence to changes in the cells sometime after the young sporophytes were well advanced toward the complete development of prothalli.

Albinism in Pinus

In 1947, A. G. Johnson in the *Journal of Heredity* (39:9-10) reported albinism in the Austrian pine (*Pinus nigra* var. *austriaca* Schneid.).

From thirty-five sound seeds extracted from 25 cones, seventeen seedlings were of normal coloring while the remaining eight were albinos. In another lot of Austrian pine seeds the same author reports abnormally pigmented seedlings in a ratio of 112 normal to thirteen deficient. In these cases the deficient seedlings had normally pigmented cotyledons but the primary needles were found to be almost without green coloring. The same author reports albino seedlings in plantings from purchased seed of P. Peuce and P. Jeffreyi.

Dr. Lawrence H. Snyder in his *Principles of Heredity* (D. C. Heath and Company, 1946) refers to a campus of a large southern university in which there is a row of maple trees from the seeds of which there are regularly one-fourth albino seedlings.

Albinism in Grapefruit (*Citrus grandis* Osbeck)

In a planting which I made of about sixteen seeds from a single grapefruit there were four albinos among the sixteen seedlings. As in most of the citrus fruits there is a high proportion of polyembryony and among these seedlings both the normal and the albino seedlings showed this character.*

One of my former students working with citrus fruits found that the seedlings from one hundred seeds of *Citrus grandis*, all of which were normal as to coloring, were 69% polyembryonic. On another occasion when I planted grapefruit seeds for class demonstration, I recall one seedling which bore one green leaf and one white leaf. I regret that I have not a follow-up of this seedling. Neither did I make a careful examination of it in order to determine whether it was one of a polyembryonic complex or whether it was truly a single seedling. Obviously it was of a one-sided inheritance and whether this was a mutation which occurred within its own lifetime or not is also a question.



An Oak Albino

A recent discovery which sharpened our interest in albinos was purely an accident on the campus of Rosary College. This was a single albino seedling of the bur oak (*Quercus macrocarpa Michaux*) in July, 1948. True to form excepting that it was more spindly and fragile, it was not difficult to identify this abnormal seedling as this species by comparison with a large number probably scores of other normal seedlings of the same

species. Rather close to the residence building, there are five large bur oaks to the southeast. The young albino plant was almost directly beneath one of these trees. Nevertheless it might well have come from one of the acorns borne on any one of these five trees because many of the normal seedlings were found as much as twenty rods away. At the time I searched the campus for more albino oaks as possible progeny of some of the other species of oaks which are among the campus trees but found no other. It may well be, however, that the one I happened to stumble upon was the only one which had escaped the gardener's sickle. At the time (about July 12, 1948) all of the normal oak seedlings still standing were quite well advanced. Unfortunately, 1948 produced practically no bur oak fruits; whereas in the fall of 1949 there was a good crop. It happened that I spent the summer of 1950 in New York state and the following summer in Ohio. Other summers since gave little opportunity to look for albino seedlings in the Rosary College campus. The staff of *Oak Leaves*, Oak Park, Illinois, published a picture story (July 15, 1948) of the first, last, and possibly the only albino oak seedling ever to come to our notice.

*O'Hanlon, M. Ellen, *Fundamentals of Plant Science*, (plate facing p. 139), Crofts, 1941.

PHOENIX, Arizona—(Special)—John P. Weaver, son of Mr. and Mrs. Homer Weaver of 344-23rd Street, Canton, Ohio, has enrolled in the advance class to be graduated in June 1955 at the American Institute for Foreign Trade at Thunderbird Field, Phoenix, Arizona.

Specializing in Latin America, Weaver is taking the school's intensive training course in preparation for a career in American business or government abroad.

Weaver is a graduate of Lehman High School, Canton, Ohio and re-

ceived his Bachelor of Science degree in biology at Mt. Union College in Alliance, Ohio. Weaver was affiliated with Sigma Alpha Epsilon and served as president and rush chairman of this organization. He also was a member of Phi Sigma, national biology honorary fraternity. Active in varsity track, Weaver was a tumbling and trampoline instructor and served as president of the Intramural board at Mt. Union College. He was also a member of Sigma Delta Psi, national athletic honorary fraternity.

THE VERTEBRATE FAUNA ON THE CAMPUS OF KENT STATE UNIVERSITY

By Ralph W. Dexter

Department of Biology

Kent State University, Kent, Ohio

Beginning with the fall of 1937, the writer has kept a record of the animal life collected and observed on the campus of Kent State University. An annotated checklist is presented here based upon records from all sources — class field trips, special student projects, trapping and banding activities, specimens and records brought to the laboratory by interested persons, and personal observations. Acknowledgment is made to those persons who have contributed to this study either in the introduction to each section or in reference to specific records.

The area included in this report consists of the 250 acres comprising the present campus plus the fringe to a width of about one city block (see fig. 1). Habitats include woods, parkland, a swamp, a bog, fields, abandoned farm land, university buildings and grounds, and the margin of city residences.

As the university building program proceeds, the natural habitats for wild animals are necessarily diminished. Already some of the birds which formerly nested on the university grounds have been forced to leave because of the elimination of suitable nesting habitats. It is to be hoped that enough of the natural areas will be preserved to maintain the present vertebrate fauna for future generations of students to study and enjoy.

The key to symbols used in this report is as follows: A = abundant; C = common; F = frequent; U = uncommon; R = rare; B = banded and released on the campus; N = known

to nest on the campus. The notations on abundance are comparative estimations and refer to abundance at the peak season for each species.

I. Amphibians

The principal study of the Amphibia on the campus was made by Chiavetta (1) who collected specimens of frogs and toads from the university swamp and bog. Others have been collected by the classes in field zoology. Eleven species have been recorded. About 30 are known to occur in Ohio. Red-backed Salamander F; Dusky Salamander U; American Toad C; Spring Peeper A; Tree Frog F (one was found on the roof of Kent Hall 5-23-44); Cricket Frog C; Swamp Cricket Frog U; Leopard Frog F; Pickerel Frog R; Green Frog F; Wood Frog F.

II. Reptiles

Of the 37 species of Ohio reptiles, eight have been found on the campus. Notes on some unusual records have been published by the writer (2). Blue-tailed Skink R (one collected at university bog 6-25-40) Garter Snake C; Ribbon Snake F; De Kay's Snake C; Smooth Green Snake F (see reference 2 for details of this species on the campus); Painted Turtle F; Spotted Turtle U; Box Turtle (this is not native, but has been introduced. One liberated on the campus by Wayne Christner in May, 1952, was recaptured a month later. It was brought here from Carroll County and initialed for identification).

III. Birds

A total of 143 species of birds has been reported from the campus. Al-



Aerial view of the Kent State University campus in 1949 at the time of construction of Stoper Hall.

together, 329 are known from the Cleveland area. The campus is included each year in the national Christmas bird count (12). Special projects on bird study within the bounds of the campus have been made by Garmus (15), Genuske (16), Hollett (17), Lave (18), Rosenberger (20), and Tawney (22). In addition, many former students have assisted in the bird banding program on campus. Special acknowledgement is due Robert W. McNeese, who compiled a check list of the spring birds for four years, and Mrs. Lawrence R. Fulmer who operated a substation for bird banding at her residence on Crain Ave., between 1947-51.

A. Permanent Residents

Cooper's Hawk F; Red-tailed Hawk F; Red-shouldered Hawk F; Bald Eagle R; Marsh Hawk C; Sparrow Hawk F, B (one juvenile captured at downtown Kent 6-6-52 was banded and released on the campus); Bobwhite C, N; Ring-necked Pheasant C; Rock Dove C, N (this bird roosts regularly on the roof of the Administration Building); Barn Owl R, B (One captured at Streetsboro 6-1-40 was banded and released on campus); Screech Owl F, N, B; Hairy Woodpecker F, N; Downy Woodpecker A, N, B; Blue Jay A, N, B (One banded 4-30-41 was recaptured 5-25-44);

Black-capped Chickadee C, B (One banded 4-17-48 returned 10-27-48); Tufted Titmouse C, B; White-breasted (One observed by Mrs. Fulmer on ed Nuthatch C, B; Carolina Wren R Crain Ave. 10-22-46 through 12-31-46); Cedar Waxwing A, B; Starling A, B; English Sparrow A, N, B (In a special study on the English Sparrow (3) the writer banded 668, of which 67 were trapped subsequently as repeats and 11 were retaken in later years as returns); Cardinal A, B; Goldfinch F, B.

B. Winter Residents and Visitors

Slate-colored Junco C, B; Tree Sparrow C, B; Evening Grosbeak R (Four were observed in Dix Woods on 5-18-47); Red Poll R (Ten observed 2-5-47).

C. Spring and Fall Migrants

Pied-billed Grebe U; Great Blue Heron U; Black Duck F; Baldpate U; Pintail R; Blue-winged Teal U; Shoveller R; Lesser Scaup Duck U; Turkey Vulture U; Osprey R; Semi-Palmated Plover R; Yellow-bellied Sapsucker F; Acadian Flycatcher U; Olive-sided Flycatcher R; Tree Swallow R; Red-breasted Nuthatch R (One seen daily on Crain Ave. through winter of 1948-49 by Mrs. Fulmer. Observed on campus by students in the spring of 1952); Brown Creeper F, B; Winter Wren R, B (One banded by Mrs. Fulmer 5-4-49); Mockingbird R (One observed by Mrs. Glenn Lefler on Highland Ave. about 1940); Hermit Thrush C, B; Olive-backed Thrush F, B; Gray-cheeked Thrush U, B; Veery F, B; Golden-crowned Kinglet C, B (Also a common winter visitor); Ruby-crowned Kinglet C, B; Migrant Shrike R; White-eyed Vireo R (One seen in Dix Woods in May, 1951, by Mrs. Fulmer and Mr. and Mrs. George Wiley); Yellow-throated Vireo U; Blue-headed Vireo R; Warbling Vireo C; Black and White Warbler F, B; Worm-eating Warbler R (One seen in Dix Woods by Mrs. Fulmer 5-19-44; another one seen by Mrs. Fren Muselman on Lincoln Ave. in spring of

1945); Blue-winged Warbler F; Tennessee Warbler F, B; Nashville Warbler U; Magnolia Warbler F, B; Cape May Warbler F; Black-throated Blue Warbler U, B; Myrtle Warbler C, B; Black-throated Green Warbler F, B; Cerulean Warbler R; Blackburnian Warbler F, B; Chestnut-sided Warbler F; Bay-breasted Warbler F, B; Western Palm Warbler F; Northern Water Thrush U; Kentucky Warbler R (One found dead at edge of campus 5-16-50); Mourning Warbler R; Yellow-breasted Chat U; Canada Warbler U; Rusty Blackbird U; Purple Finch U; Pine Siskin R (A flock of 35-50 observed along Crain Ave. 5-14-53); Savannah Sparrow F; White-crowned Sparrow R, B; White-throated Sparrow C, B; Fox Sparrow F.

D. Summer Residents and Visitors

Green Heron U; American Bittern R; Mallard C, N; Wood Duck U (Nesting boxes to attract Wood Ducks were set up in the university swamp in the spring of 1952); Sora R; Florida Gallinule R (One found dead on the campus 5-7-41); Killdeer A; American Woodcock R (One found nesting near the campus in the spring of 1950 by Prof. Eleanor Gray); Spotted Sandpiper U; Mourning Dove A, B, N (One banded 4-30-48 was recaptured 5-6-49); Yellow-billed Cuckoo F; Black-billed Cuckoo F, B; Nighthawk F, B, N (A special study has been made of Nighthawks nesting on the roof of campus buildings. One nesting female has been captured over a period of four years. Nine juveniles have been banded. Life history studies have been published (8) through the season of 1951); Chimney Swift A, B, N (Special research has been done on the life history of Chimney Swifts nesting in the air shafts of the university buildings. A total of 776 has been banded since 1944, of which 141 have returned for one or more years. In recent years about 45 banded Swifts return each year. One Swift has nested each year for at least 10 years. Usually about 17 pairs nest in the campus eve-

ry year. Recoveries have been made from Chagrin Falls, Ohio, and Rome, Georgia. One captured bird had been banded at Nashville, Tennessee, five years earlier. A number of papers have been published (4-7; 9-11; 14) while others are in preparation); Ruby-throated Hummingbird F (Two were captured in Wills Gym but could not be banded because of their tiny feet); Belted Kingfisher U; Yellow-shafted Flicker C, N; Red-headed Woodpecker U, N; Kingbird R; Crested Flycatcher F, B; Phoebe F; Wood Pewee C; Prairie Horned Lark F; Bank Swallow U, B, N (Nested in gravel banks left exposed when athletic field was constructed in 1939; 24 were banded); Rough-winged Swallow U, N, B (Nested with the Bank Swallows in 1939; 1 was banded); Barn Swallow F; Purple Martin A, B, N (Three Martin houses have been erected on the campus); Crow C, B, N; House Wren A, B, N (Wren houses have been placed on the campus by Bernhardt Raithel); Bewick's Wren R (One pair nested in the spring of 1944 on top of Summit Hill; one seen in Dix Woods 4-27-50 by Mrs. Fulmer); Long-billed Marsh Wren R; Catbird C, B, N; Brown Thrasher C, B, N; Eastern Robin A, B, N (Two recoveries of banded Robins have been made. One from Brimfield, Ohio, and one from Graceville, Florida); Wood Thrush C, B, N; Bluebird F, N (Bluebird houses have been set out by Bernhardt Raithel); Blue-gray Gnatcatcher U; Red-eyed Vireo C, N; Yellow Warbler A, B; Ovenbird F; Northern Yellow-throat C, B; Hooded Warbler R, B (One banded by Mrs. Fulmer 7-16-48); Redstart F, B, N; Bobolink F; Meadowlark A, N; Red-winged Blackbird C, N; Baltimore Oriole F, B, N; Bronzed Grackle F, B (one recovery from Monroe Falls, Ohio); Cowbird C, B; Scarlet Tanager F; Rose-breasted Grosbeak F, B, N; Indigo Bunting F; Red-eyed Towhee C, B (one banded 4-28-47, returned 7-14-48); Grasshopper Spar-

row U; Vesper Sparrow F; Chipping Sparrow C; Field Sparrow A, B; Swamp Sparrow F; Song Sparrow A, B, N (One banded 11-13-47 returned 4-6-48, and found dead 6-27-48; another banded 10-27-48 returned 5-2-51).

IV. Mammals

One-half of the 51 species of mammals known to live in Ohio have been found on the campus. The main study of mammals on the campus was made by McGinnis (19).

Virginia Opossum F; Hairy-tailed Mole C; Star-nosed Mole R (one captured by Prof. C. N. Savage 7-14-48; another one was killed at University Heights in Oct. 1952); Short-tailed Shrew C; Little Brown Bat C, B (Three have been captured in university buildings, two of which were banded and released. For many years bats have appeared in the auditorium during evening performances. Dr. Elizabeth Smith released 223 banded Little Brown Bats on the campus in nine homing experiments over a period of three years (21). Six of these were later recaptured at their original home site 20 to 86 miles away); Big Brown Bat U, B (Two captured on the campus have been banded); Red Bat R (One of the two specimens known from northeastern Ohio was found at the edge of the campus in the summer of 1952); Red Fox U; Common Skunk F; Raccoon F; New York Weasel F; House Mouse A; Norway Rat C; (The last two species are commonly found in the university buildings); Meadow Mouse C; White-footed Deer Mouse A; Chipmunk A; Muskrat C; Meadow Jumping Mouse F (The writer has published a report on the occurrence of this mammal in Ohio, including four records from the campus (13); Red Squirrel F; Gray Squirrel C; Cottontail Rabbit A; White-tailed Deer U (One jumped through a rear window of Kent Hall on May 24, 1950).

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ECOLOGICAL STAGES OF PLANT SUCCESSION IN DAVIDSON COUNTY

By Neal McAlpin (Zeta)

Tennessee State University

Nashville, Tennessee

An extensive report on the present status of the succession of plant life in the Forest of Davidson County has not been made as a whole. A report (2) on the cedar glades in a section of Davidson County near Lavergne has been made by Freeman. This on the other hand is a part of the composite picture.

Field observations were made to determine the present stage of plant succession in Davidson County Tennessee. This region may be characterized as an area in which the horizontal limestone of the Lebanon formation is

at or very near the surface. In many places in this area bed rock may be found exposed at the surface. While on the other hand many places have the bedrock located at great depths.

Methods And Materials

A random sample of the vegetation was taken of Davidson County on four compass points: north, south, east, and west. The sampling was done by the list-count quadrat method. Eight quadrats were taken at random on each compass point. With Nashville being used as a pivot point, four quadrats were taken at different places

on each point in a different woodland. Quadrat studies were made to determine the number of individual species and their basal area to supply a reliable basis for determining the dominant plants.

Environmental factors were measured to some degree in order to point out the prevailing conditions during this study. Those environmental factors measured were: The temperature

of the soil at the surface, the temperature of air at five feet from the surface, the canopy of the quadrat, the depth of A0 layer, A1 layer, A2 layer, and the soil texture.

Discussion

The minimum temperature was varied as much as the maximum temperature, see table 1, which was due directly to the percent of canopy

TABLE I

Temperature readings of Two Strata of Air, Depth of A4, A1, A2 layers and soil texture.

Q'd-rats	Depth of layer in inches			Soil Texture	Temperature Five Feet Above Surface				Temperature at Surface of Soil			
	A0	A1	A2		E	S	W	N	E	S	W	N
1	½	1	1	clay loam clay	88.0	90.0	88.5	86.0	87.0	88.0	87.0	85.0
2	0	1	1	loam clay	86.0	86.5	86.0	85.5	84.0	85.0	85.0	85.0
3	½	1	2	loam clay	87.0	86.0	87.0	87.0	86.0	85.5	86.5	86.5
4	½	1	3	loam clay	86.5	87.0	86.0	86.0	85.0	86.0	86.0	85.0
5	½	1	2	loam clay	79.0	79.0	80.0	77.5	75.0	76.0	78.0	74.0
6	½	1	1	loam clay	80.0	81.0	80.0	89.0	80.0	80.0	80.0	80.0
7	1	1	1	loam clay	79.0	80.0	81.5	80.5	77.0	79.0	80.0	80.0
8	0	½	1	loam	85.5	84.0	85.0	85.0	84.0	83.5	84.0	84.0

involved in each quadrat and the amount of covers on the forest floor. The high temperatures may be an indication of sparse foliage on the trees or a reduced number of trees present in the quadrats: A study of the concurrent temperatures of the two strata shows that the two elevations of the air are rather closely parallel with each other, but those at the surface are lower than those at an elevation of five feet, and for the most part formed a smoother curve.

After a suitable number of quadrats had been examined, it was possible to calculate the standard measures of vegetation.

Frequency

Frequency, being one of the standard measures of vegetation, represents the percentage of quadrats occupied by a given species. Table II gives the order of frequency in which the species occurred in the quadrat.

Density

Density represents the average number of individuals of a species per quadrat and is obtained by dividing the total number of individuals of that species in all quadrats by the total number of quadrats. Table III gives the density and relative density for all quadrats in their numerical order.

FREQUENCY TABLE II

Name of Tree	No.	Frequency %	Name of Tree	No.	Frequency %
Ash	12	12/32=37.5	Buckeye	2	6.2%
Elm, American	10	10/32=31.2	Cedar	1	3.1%
Oak Chestnut	7	7/32=21.8	Cherry, Black	1	3.1%
Hickory,					
Shagbark	7	7/32=21.8	Gum, Black	1	3.1%
Hackberry	7	7/32=21.8	Gum, Sweet	1	3.1%
Oak, White	6	6/32=18.7	Heaven Tree	1	3.1%
Locust, Black	4	4/32=12.5	Mulberry	1	3.1%
Maple, Sugar	3	3/32= 9.3	Persimmon	1	3.1%
Tulip Tree	3	3/32= 9.3			
Oak, Red	14	14/32=44.6	Sassafras	1	3.1%

The relative density expresses the percent of density of one species in relation with total number of species. Examination of Table III clearly indicates that Red Oak and Hackberry

with 15.4% and American Elm and Ash with 14.7% and 12.5% respectively comprise the largest percentage. The total number of individuals is 136.

TABLE III

Name of Tree	No.	Density	Relative Density	Name of Tree	No.	Density	Relative Density
Hackberry	21	.656	15.4%	Sugar Maple	4	.125	2.9%
Oak, Red	21	.656	15.4%	Buckeye	2	.062	1.4%
Elm, American	20	.598	14.7%	Heaven	2	.375	1.4%
Ash	17	.531	12.5%	Cedar	1	.031	.7%
Hickory,							
Shagbark	13	.375	8.8%	Black Cherry	1	.031	.7%
Oak, Chestnut	8	.250	6.6%	Black Gum	1	.031	.7%
Tulip Tree	7	.218	5.1%	Sweet Gum	1	.031	.7%
Locust, Black	6	.187	4.4%	Mulberry	1	.031	.7%
Oak, White	6	.187	4.4%	Persimmon	1	.031	.7%
Sassafras	5	.156	3.6%				.7%
Total					136		100%

Dominance

Dominance expresses the average basal area of each species per quadrat and is obtained by converting each circumference to area, adding all values for each species and dividing by

the total number of quadrats. The total basal area of all individuals is 15,947 square inches. Table IV gives the numerical order of dominance in which the species occurred in the quadrats.

TABLE IV

Name of Species	Dominance	Dominance per cent	Name of Species	Dominance	Dominance per cent
Oak, Red	158.54	31.81%	Locust, Black	12.91	2.59%
Ash	96.12	19.19%	Maple, Sugar	9.32	1.87%
Hackberry	48.72	9.77%	Gum, Black	4.59	.92%
Tulip Tree	43.82	8.79%	Cedar	3.22	.64%
Oak, Chestnut	35.73	7.17%	Gum, Sweet	1.43	.28%
Elm, American	26.53	5.32%	Heaven Tree	.84	.17%
Shagbark			Buckeye	.78	.15%
Hickory	20.80	4.17%	Mulberry	.42	.08%
Sassafras	18.98	3.81%	Black Cherry	.36	.07%
Oak, White	14.25	2.86%	Persimmon	.36	.07%
Total					100%

According to the sample taken by the quadrat method, the present status of the forest of Davidson County is dominated by Red Oak and Ash (2) with a dominance per cent of 31.81% and 19.29% respectively. In general, this may constitute the present pattern moving rather slowly to a more complex situation. In many instances the A0 layer was zero which may prohibit to a large extent seedlings of succeeding plants from starting.

Hackberry, Tulip Tree, Chestnut Oak, American Elm, and Shagbark Hickory comprise the next highest dominance pattern.

It was noticed that cedar acted as a pioneer tree and as soon as other species moved in and formed a canopy over it, it would desist in growth. In

some instances they were found in a desisted state of growth in the interior of the forest where the succeeding species had taken over. In other instances, they were found around the margins of the wooded areas.

On a whole, the forest of Davidson County is rather young with one exception being recorded on the south compass point. There a definite Oak sub-climax is present. An oak stump relic was found to have 175 growth rings.

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DRY FARMING TOMATOES IN WESTERN MONTANA

Audra Elizabeth Browman
Missoula County High School
Ludvig G. Browman
Montana State University

It was decided to analyze environmental factors associated with the successful raising of tomatoes without irrigation in Western Montana for a Westinghouse Science Talent project. The average annual rainfall for Missoula, Montana, according to the records kept since 1900 is 12.76 inches. We wondered whether the average moisture expectancy was adequate to raise tomatoes, especially since only 1.61 inches of rain normally falls during the months of July and August which are critical months for fruit formation.

A plot of ground occupied until the fall of 1952 by the M. S. U., School of Forestry Nursery had been abandoned for conversion to other uses. This piece of land was made available during the spring and summer of 1953. This land is an old alluvial river bottom of a reddish sandy silt loam.

Seedlings and young trees had been removed during the summer and fall of 1952 and the land lay undisturbed until April, 1953. Sub-surface moisture may have accumulated as a result of overhead sprinkling during the summer of 1952, and subsequent precipitation.

Experimental Plots

A random plot of soil which appeared to be uniform in color, structure, and texture (pH 6.8) approximately 14 ft. x 35 ft. in size was divided into 16 four foot squares separated down the center by a two foot pathway. No plowing nor spading was done during the spring months, except that on April 5, 1953 the entire experimental area was raked clean and level with a hand rake. Each pair of experimental plots, separated by the pathway, received identical treatment and there were seven such pairs. Plots

1 and 2 were not disturbed after April 5 and weeds were allowed to grow unhindered. In plots 3 and 4 the weeds were carefully removed by hand once each week with a minimum of disturbance to the soil. Plots 5 and 6 had a one inch layer of 2 year old coniferous tree sawdust placed on top with no further disturbance. Plots 7 and 8 had a commercial soil conditioner (polymerized Acrylonitrile) worked into the top three inches of soil with no further disturbance. Plots 9 and 10 had the top inch of soil cultivated once each week with a hoe for the entire duration of the experiment. Plots 11 and 12 had one inch of a 2 year old coniferous tree sawdust worked into the top inch of the soil, which was further

cultivated once each week with a hand hoe for the duration of the experiment. Plots 13 and 14 were kept free of weeds until June 16 only, and received no tomato plants.

John Baer tomato plants, about 10 inches in overall height, with 5-6 side branches, were planted to a depth of 4-5 inches on June 16, in staggered alternate squares. Only two tomato plants each were planted in the alternate plots for a total of only 12 plants. No water was available to these plants at any time except the accumulated soil moisture and natural rains. Soil temperature and soil moisture determinations were made at fortnightly intervals in every square from April 11 until Sept. 11, 1953.

TABLE 1

Weather Summary
Missoula, Montana (1)

Month	Rainfall		Temperature		Dew point 1953 °F	% available sunshine 1953
	1900-52 in.	1953 in.	1900-52 °F	1953 °F		
Jan.	.81	2.19	19.4	35.8	29.5	10
Feb.	.82	1.37	25.7	31.8	24.0	33
Mar.	.83	.20	34.7	37.7	24.8	39
Apr.	.90	.89	44.7	42.0	26.5	42
May	1.64	2.78	53.6	48.2	33.0	44
June	1.87	1.12	60.2	56.3	45.0	51
July	.83	.11	68.4	67.8	39.0	94
Aug.	.78	.45	66.1	65.5	45.0	71
Sept.	1.07	.72	55.8	59.1	36.0	76
Oct.	1.07	.09	44.9	47.2	31.5	66
Nov.	1.11	.62	31.9	37.3	29.0	47
Dec.	1.03	.82	23.6	32.1	26.0	21
Total or average	12.76	11.36	44.1	46.7	32.4	49.5

(1) Weather Bureau, U. S. Dept. of Commerce.

Soil Analyses

a. Appearance. Two vertical soil samples yielded: black-reddish silty loam down to 12 inches; brown-chestnut sandy loam 12-20 inches; red-yellow sandy loam 20-30 inches; pale yellow sandy loam 30-59 inches; and rocks and gravel below 59 inches.

b. Weight volume of soil.

TABLE 2

(1) Vertical soil samples, plots 13 - 14

Depth inches	Wt/vol. gm/cc.	Depth inches	Wt/vol. gm/cc.
0-4	1.31	28-32	1.36
4-8	1.33	32-36	1.39
8-12	1.49	36-40	1.38
12-16	1.46	40-44	1.33
16-20	1.38	44-48	1.39
20-24	1.34	48-52	1.33
24-28	1.32	52-56	1.36

(2) Surface soil samples, top 4 inches

Plot	Wt./vol. gm/cc.	Plot	Wt./vol. gm/cc.
1&2	1.34	7&8	1.26
3&4	1.34	9&10	1.29
5&6	1.34	11&12	1.26

c. Physical make up of soil.

Boyocuous, wet method: 54% sand, 31.4 silt, 14.6 clay.

Soil sieves: 76% of air dry soil could be shaken through .5mm. soil sieve; 55% could be shaken through the .25mm. soil sieve.

Furnace: 4.2% by weight combustible and volatile in furnace.

Water soluble: 5.4% by weight was leached out after 100 days in water which was siphoned off and replenished fortnightly; in the dark.

Extreme care was taken to avoid disturbance of soils in the immediate vicinity of the site where the soil sample was being taken. Soil samples were always taken at new locations and no spot was ever sampled twice. All soil moisture determinations were based on 24 hour oven-dry soil samples. When ranges in depth were sampled the soil moisture and soil temperature is usually that of the soil near the deeper extreme of the range given. All soil temperatures were taken with a mercury bulb thermometer thrust into the soil to a depth of four inches, or laterally into the stratum for four inches, and allowed to stabilize for three minutes. In dry or hard packed soils a quarter-inch steel rod was driven into the soil first and then followed by the thermometer.

Vertical soil samples for moisture analyses were taken each month from plots 13 and 14 to at least 36 inches, and vertical soil samples were also taken in every plot to a depth of 24 inches at the termination of the experiment. Soil samples for moisture analysis and simultaneous recording of temperature, were taken at the 2-4

inch depth in every plot every fortnight.

Results

Reference to Table 1 indicates that a summer only slightly cooler than normal could not offset the very dry (1.68 inches of rain, or 48% of normal), open (July had 94% of available sunshine, and 1.05 sky cover) conditions that existed from June through August, 1953.

Vertical soil samples indicated that the heaviest weight per unit volume of soil was at the 8-16 inch depth (Table 2) and that the highest percentage of soil water was at the 12-24 inch depth quite consistently for the four months reported (Table 4). Most of the tomato plants had very few macroscopic roots beyond the 15 and 16 inch depth as revealed when plants were dug up on Sept. 7. The majority of the root systems seemed to have been spread out in the 6 to 12 inch depth.

Soil moisture in the top 4 inches of soil was rapidly depleted after the first week in July (Table 3). There was a gradual loss in soil water at the lower levels also after the middle of July (Table 4) even though there were no tomato plants nor weeds, on the two plots analyzed vertically, during the growing season. The maximum soil moisture at any depth tested was at the 18-24 inch level on July 10.

At the termination of the experiment on Sept. 7 vertical soil samples were taken on all 12 plots down to a depth of 24 inches. Ten plots had a maximum water content at the 20-24 inch depth. One plot had a maximum soil moisture content of only 8% at the 2-4 inch level (plot 1 weedy), the other nine plots ran from 11-20% with an average of 13.5% soil moisture. Two plots had the maximum water content at the 14-18 inch depth with an average of 15.8%.

Temperatures on the soil surface rose during the summer months to a maximum recorded of 63° C. on July

30. However the soil temperature at the 4 inch depth rose more gradually and steadily and peaked on July 16 at 39° C. Soil temperatures below 36 inches peaked on Aug. 10 although soil temperatures above this level were gradually tapering off. A sample soil temperature in depth: Aug. 10: 7 in. 24° C., 15 in. 22° C., 22 in. 22° C., 33 in. 20° C., 41 in. 19.5° C., 55 in. 18° C., 59 in. 16.5° C.

The environmental conditions were such that none of the tomato plants exhibited signs of wilt. However, inspection of Table 5 indicates that only indifferent success was obtained in yield except where the soil was continuously cultivated. Rainfall during July and August totaled only .56 inches. At the end of the experiment on Sept. 7 soil moisture at the 12 inch and 18 inch depth in the cultivated

TABLE 4

Soil moisture (oven dry) and soil temperature C from plots 13 and 14, which received no treatment, and had no tomato plants.
June 17 to Sept. 12, 1953

Depth in inches		Dates			
		6/17/53	7/10/53	8/10/53	9/12/53
0 - 6	% water °C	16.9% 23°	6.8% 34°	3.1% 31°	5.9% 18°
6 - 12	% water °C	14.9% 18°	13.8% 25°	8.3% 22°	7.9% 18°
12 - 18	% water °C	22.7% 17°	20.9% 23°	8.1% 22°	15.0% 19°
18 - 24	% water °C	19.0% 16°	24.2% 23°	22.4% 22°	13.9% 19°
24 - 30	% water °C	19.2% 15°	22.5% 22°	16.7% 21°	13.8% 18°
30 - 36	% water °C	15.8% 14°	14.6% 21°	13.4% 20°	10.5% 17°

plots was 9% and 15% respectively, while in the non-cultivated plots at 12 inches and 18 inches the soil moisture was 8% and 9% respectively.

Successful plots then were those in which the surface soil was cultivated frequently. As a matter of fact the cultivation was so rigorously adhered to that before the light rain showers of late August a fine dust mulch covered the cultivated plots. The surface of the two plots from which weeds were pulled by hand were "hard as a rock".

Conclusion

Tomatoes can be successfully raised

under dry farming conditions in Western Montana provided there is adequate stored soil moisture, and the surface soil is mulched. Neither a commercial soil conditioner nor a surface layer of sawdust alone was beneficial to tomato production under the conditions that existed in this investigation.

We wish to gratefully acknowledge the use of soil cans, scales, oven, and other soils apparatus from the Botany Department, Montana State University.

TABLE 5

Tomato production on experimental plots
(All numbers rounded to the nearest whole figure)

	Plot Treatment	No. of tom. plants	Total flower count to Aug. 15	Total No. tom. $\frac{1}{4}$ in. or over as of Sept. 7	% of flowers as of Aug. 15 to tom. as of Sept. 7	Total weight of tom. fruit 9/7	Ave. wt. per tomato 9/7	Total weight of tom. plant only 9/7	Ratio of total plant and fruit to plot No. 1
1	None weeds	2	36	2	6	30	15	73	1
4	Weeds pulled by hand	2	103	17	17	347	21	305	6
5	1 inch dawdust weeds	2	71	15	21	372	27	206	6
8	Acrylonitrile weeds	2	67	10	15	116	12	181	3
9	cultivated 1 inch/weekly	2	184	53	29	2718	51	1233	39
12	1 inch sawdust cultivated 1 inch/weekly	2	218	57	26	3497	62	1384	48

IN MEMORIAM

Phi Sigma extends fraternal condolences to its sister biological society, Beta Beta Beta, on the sudden passing of her founder,

DR. FRANK G. BROOKS

4 March 1955.

He founded Tri-Beta at Oklahoma City in 1922, was its only National Secretary-Treasurer, and from 1930 on, the Editor of "BIOS."

Dr. Brooks was born in New Berlin, Pa., on April 8, 1893. He received his bachelor's degree in biology from Allegheny College, his master's

from the University of Oklahoma, and his doctorate from Johns Hopkins. For seventeen years he was professor of biology at Oklahoma City University. He then moved to Cornell College, Mount Vernon, Iowa, where he was head of the biology department until his death. He was a member of many scientific organizations and also served as editor of the *Proceedings* of the Iowa Academy of Science from 1947-1955. He was a consultant for the Examinations Staff of the Armed Forces Institute and planned and outlined the course in biological science for the E. S. A. F. I.

A TIMELY EDITORIAL

IT MAY BE YOUR LAST CHANCE

"The only thing necessary for the triumph of evil is that good men do nothing"—EDMUND BURKE.

We can rightfully boast of our material advances in this 20th century. But we should not blink at the fact that it has been likewise the bloodiest period in human history, and that modern ingenuity has now made possible universal death and destruction through the atom and hydrogen bombs.

A Grim Record

During the past 40 years, 63 million human beings were killed and more than 103 million were maimed and crippled. The cost in money alone was more than a thousand billion dollars.

Within the past few years, 33 thousand Americans were killed and more than 103 thousand wounded in the Korean conflict that cost the American taxpayers another hundred billion dollars.

Out of a budget of 62 billion dollars to run the U.S.A. for the year 1955-56, nearly 41 billion is for defense against new and deadly conflicts. In addition, four and a half billion dollars must be set aside to pay for obligations accruing from past wars. Therefore, only 17 out of 62 billion dollars is being budgeted for the normal functions of government. And still no lasting peace!

What Can You Do About It?

The defeatist attitude, *"my opinion doesn't count in shaping the policies of our government,"* can be a very harmful one. Those who would undermine our country do everything they can to encourage this point of view. It leaves the field free for them.

The importance of the role each

individual can play is stressed in a 12-page booklet, *"Your Opinion Counts"*, recently issued by the State Department in Washington, D.C. It states most emphatically the part you can play—and must play—if we are to survive as a free nation. Here are a few quotations from it:

- a. "In a democracy, no government agency can possibly function effectively if it cannot hear the voice of the people."
- b. "No policy—foreign or domestic—makes sense if the American people do not display an interest in it. And certainly no line of foreign policy can succeed unless our people are informed of it, have a clear understanding of it, and out of their knowledge and free will support it."
- c. "The bedrock foundation of United States foreign policy must come from the American people."
- d. "Because an uninformed people is susceptible to the charlatan and rabble-rouser, it is essential to the well-being of a democratic government to keep the people informed—just as it is against the interests of a dictatorship to do so."
- e. "Any letter you write to the Department of State is read."
- f. "The more careful you are in thinking out and stating your critical comments and recommendations, the more widely read your letter will be within the Department."
- g. "One resolution from one organization—even if it happens to be a large one with chapters all over the country—does not mean that policy planners will adopt or abandon a specific course of action; but if 100 or 200 organiza-

tions adopt resolutions favoring a particular measure, that measure may well become a part of our foreign policy."

- h. *"On the other hand, if the majority of American organizations expressed strong disapproval of a proposed policy, it would be folly for the Government to attempt to ignore this opposition."*
- i. *"Because your opinion counts and counts for so much in our conduct of foreign affairs, and because our national survival depends upon how wisely we conduct them, many agencies throughout the United States stand ready to help you develop an informed opinion. Many of our cities have organizations which exist solely for the purpose of increasing understanding of world problems, and our relations with other countries. These groups maintain libraries open to all comers, procure lecturers, and sponsor discussion groups. Small towns in the area can usually obtain literature and speakers from these groups."*
- j. *"Your opinion counts even if you neglect to express it, because, in failing to say what you think, you lessen the likelihood of the course you favor being adopted and pursued."*
- k. *"Too often it happens that those who endorse a policy merely nod to themselves, while those who oppose it raise their voices."*
- l. *"At all times your opinion counts—but it counts for more if you register it."*
- b. *"No policy, regardless of how well it may be planned, can be launched and carried out successfully without the support of the American people. Conversely, the American people should not be expected blindly to support unexplained policies."*
- c. *"The people wield a direct influence on foreign policy. They elect a House of Representatives and one-third of the Senate every two years, and a President every four."*
- d. *"There are many ways in which the will of the people is brought to bear upon both the President and Congress. More often than not, it is channeled through organizations representing different facets of the citizenry's interest. The citizen appears to his President or his Congressman as a member of a chamber of commerce, a manufacturer's association, a labor union, a religious group, a veteran's organization, a professional group or one of hundreds of other types or organizations."*

Issues Needing Your Attention

There are numerous problems constantly facing the American government in its relations with other nations. While you cannot be familiar with all of them, still you should make your voice heard on the more important issues that involve the peace of this country as well as the world.

You should keep the State Department conscious of your views on how we should deal with foreign treaties, prisoners of war, foreign trade, our policy in the United Nations, foreign aid and the world-wide problem of Soviet Russia.

The position of our American government, for example, from the beginning has opposed the recognition of Red China and its admittance into the U.N. There are a few over the

Another booklet, *"How Foreign Policy Is Made"*, 18 pages, recently issued by the State Department, includes the following forceful reminders:

- a. *"We are a government 'of the people, by the people, and for the people.' This means that all decisions ultimately must pass the test of public acceptance."*

country, however, who are working hard to persuade the government to reverse its stand. If the vast majority of our citizens become as vocal as this small minority there is little likelihood that our government will reverse its stand. As we read in the State Department booklets, the government cannot go against an aroused public opinion.

But you must decide for yourself if, when and how you will act. It is your individual responsibility. It is between you and your conscience—between you and God.

The United States will survive as a free nation or go down into slavery as many others have, according as you

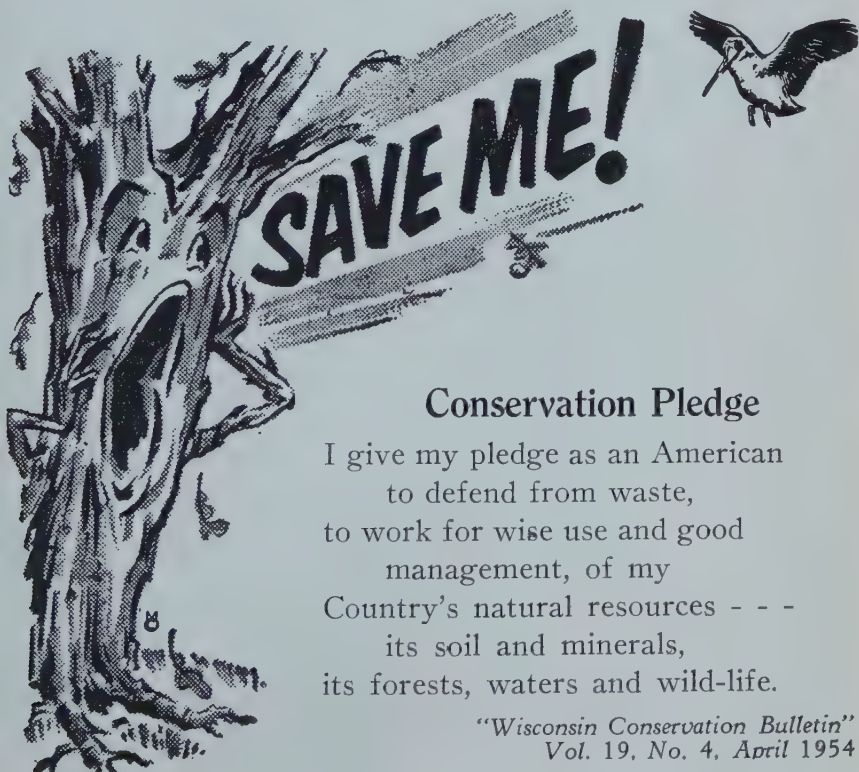
and millions of others like you show a sense of personal responsibility and individual initiative in shaping the trends of the day. God has entrusted to each of us a role to play in the maintenance of law and order here on earth. Failure to do our part will make possible the "triumph of evil."

Remember, it may be the last chance in your lifetime to make your voice heard in shaping American policy. What you do or fail to do may also involve for better or for worse the freedom of others for generations to come.

J. K. in

"CHRISTOPHER NEWS NOTES"

APRIL 1955



Conservation Pledge

I give my pledge as an American
to defend from waste,
to work for wise use and good
management, of my
Country's natural resources - - -
its soil and minerals,
its forests, waters and wild-life.

"Wisconsin Conservation Bulletin"
Vol. 19, No. 4, April 1954

CHAPTER OFFICERS AND ACTIVITIES

(As submitted by the Chapter Officers. The names of new members recently welcomed into Phi Sigma are furnished through the courtesy of the Council Secretary-Treasurer.)

BETA

—University of Michigan
Ann Arbor, Michigan

President: George Hunt, School of Forestry, Natural Science Bldg.
Vice Pres.: Kornelius Lems, Dept. of Botany, Natural Science Bldg.
Corr. Sec.: Alfred Beeton, Dept. of Zoology, Natural Science Bldg.
Rec. Sec.: Llewellya Hillis, Dept. of Botany, Natural Science Bldg.
Treas.: Paul Kannowski, Dept. of Zoology, Museum of Zoology
Editor: William Allen, Dept. of Bact., East Medical Bldg.
Council Rep.: Dr. Karl F. Lagler, Dept. of Fisheries

Beta chapter held their annual elections for officers for the next school year, 1955-1956, on March 3, 1955. The following members were elected to office: President, Leo C. Vander Beek (Botany); Vice President, Dee C. Taylor (Anthropology); Corresponding Secretary, John B. Burch (Zoology); Recording Secretary, Llewellya W. Hillis (Botany); Treasurer, Robert S. Whitmire (Botany) and Editor, Joseph H. Kite (Bacteriology). The present officers and members congratulate these people and hope they have a very successful year.

This year our chapter meetings have included a very interesting series of talks about the biology of the desert and arctic regions. Dr. William Dawson started this series with "Some Aspects of the Ecology and Physiology of Desert Animals". The following meetings included "The Geologic Pro-

cesses Active in Arctic Regions" by Dr. Donald F. Eschman, "Some Factors Affecting Plant Growth in an Arctic Environment" by Mr. Robert T. Wilce and in our last meeting, March 3, "Birds of Northern Baffin Island" by Dr. J. Van Tyne and "Some Aspects of Mammal Life in the Arctic" by Dr. W. H. Burt. We feel extremely fortunate to have these men on campus who have such an interest in these relatively undeveloped fields and have had recent experience and opportunity in studying them.

William P. Allen, Editor

Phi Sigma Awards went to:
Undergraduate — Edward Ira Sucoff
Graduate — Betty Lou Spear
Graduate — Florence Gilbert

EPSILON

—University of Denver
Denver, Colorado

President: L. Eugene Zumalt, 1843 S. Humboldt St., Denver, Colorado
Vice Pres.: Vacant
Corr. Sec.: Gunther Schlager, 1480 S. Bryant St., Denver, Colorado
Rec. Sec.:
Treas.: Michael Dizdar, 1559 Williams St., Denver, Colorado
Editor:
Council Rep.: Dr. Frederick Zeiner, Dept. of Zoology, Univ. of Denver, Denver 10, Colorado

At long last Epsilon Chapter is beginning to roll again. Graduation always results in a serious depletion of the chapter. Last spring the four people planning to return this fall were elected to the four offices. Both president and vice president were unable to return to school. Of the two remaining people one, although a regular attendant at meetings, is winding up the M.S., is seldom on the campus.

In the lack of a vice president I have taken the liberty of signing

forms as vice president, since a signature is probably preferred to a blank. I trust everything is in order and enclose my personal check for initiation fees. All records are kept in my office should you have need of them.

Fred N. Zeiner
Associate Professor

New members on May 4, 1955:
Edward Bauer Clark, William Allen Conley, Richard Charles Dybdahl, Richard T. Eliason, Neil Soren Jacobson, Elaine LaVonne Munson, Donald Jack Stouder.

Phi Sigma Awards were made to:
Undergraduate — Gunther Schlager
Graduate — Michael Dizdar

ZETA

—University of Wisconsin
Madison, Wisconsin

President: Byron Seymour Tepper,
Dept. of Bacteriology

Vice Pres.: William L. Colville, Dept.
of Agronomy

Corr. Sec.: Francis R. Johnson, Vet-
erinary Science

Rec. Sec.: Miss Wilma F. Aller, Dept.
of Botany

Treasurer: Robert Briggs, Horticul-
ture and Agronomy Depts.

Editor: Charles Ruelke, Dept. of
Agronomy

Council Rep.: Dr. Lowell E. Noland,
151 Birge Hall, Univ. of Wis.

New members are: Renee Rafaela Alexander, Robert Edgar Anderson, Patricia Ann Borden, Archibald James Bourne, Martha Christensen, Joan Louise Cormier, James Henry Grosklags, James Robert Habeck, John Desmond Hayes, Leonard Benjamin Hertz, Byron Gilmore Johnson, John Loren Kaspar, Lloyd Kennon, Leslie J. Klebesadel, Jules B. LaPidus, Grace Dorothy Link, Thomas Medwick, Louis Joseph Ravin, John Alan Roberts, Thomas Arthur Richard, Lucila Siongco Santiago, Miriam Fields Schurin, George Wilbur Selleck, Gene Lyle Spain, Herman Everette Spivey, Jr., Twila Joy Strocher, Gwendolyn

Jessica Struik, John Taiyoung Suh, Steve Stanley Szabo, Daniel Olney Trainer, Jr.

ETA

—University of Akron
Akron, Ohio

President: Edward Morris, Dept. of
Biology

Vice Pres.: Richard Ellis, Dept. of
Biology

Corr. Sec.: Kenneth Holloman, Dept.
of Biology

Rec. Sec.:

Treas.: Raymond Damian, Dept. of
Biology

Editor:

Council Rep.: Dr. Walter C. Kraatz,
Dept. of Biology, Univ. of Akron

Award at the University of Akron
in 1955 was:

Undergraduate — Raymond T. Da-
mian

KAPPA

—University of Kansas
Lawrence, Kansas

President: Wendell Showalter, Dept.
of Botany

Vice Pres.: Leland Keller, Dept. of
Anatomy

Corr. Sec.: Ellis Hayden, Dept. of En-
tomology

Rec. Sec.: Miss Maria Danguilan,
Dept. of Bacteriology

Treas.: Richard Fredrickson, Dept. of
Entomology

Editor: Miss Jacqueline Sinks, Dept.
of Anatomy

Council Rep.: Mrs. Ruth K. McNair,
Dept. of Biology, Univ. of Kansas

LAMBDA

—Montana State University
Missoula, Montana

President: Howard S. Sears, Zoology
Dept.

Vice Pres.: Bruce Lloyd, 424 Evans

Corr. Sec.: Phylis Kind, 1107 Gerald Ave.

Rec. Sec.:

Treas.:

Editor:

Council Rep.: Dr. L. G. Browman, Zoology Dept.

This year's initiates are: Lola Mae Anderson, Lawrence Mace Blakely, Robert Lee Brown, Harry Richard Fevold, Kenneth C. Grieser, James LeRoy Hardy, Paul Hudson, Gary Ronald Jystad, John Albert Morrison, Richard Eli Bowen, Henry Cecil Caldwell, Jr., Barbara Louise Erickson, Richard C. Fleming, Earl W. Lathrop, Richard Newton Lolley, Carroll Marshall Smith, Park Wayne Wagers, Bernard Benjamin Watson, Elvin Thion-sen Choong, Martha Rae Lowe, Irene Merchant Sammons, John E. Schwartz.

Awards went to: Undergraduate — Harry Richard Fevold; graduate — Vernon Duane Hawley.

NU

—Washington and Jefferson College
Washington, Pa.

President: Richard McCloskey, Hays Hall

Vice Pres.: Craig Miller, 25 South College St.

Corr. Sec.: Paul Smilow, Upperclassmen Dormitory

Rec. Sec.:

Treas.: Allen Bress, 298 East Beau St.

Editor:

Council Rep.: Dr. C. D. Dieter, Dept. of Biology

New members in Nu are: Steve Fanko, Thomas Jackson Carroll, Fred Carpi Cristofori, Laurence Linn Day, Thomas Odie English, Jr., Alan Fincklestein, Paul Leon Frederick, Jack Oscar Greenberg, Glenn H. Hostetter, Charles Richard Koch, Carl W. Konvalinka, Jr., Anthony Samuel Masstrain, John Idolo Moraca, Samuel Gerald Morosco, III, Lee David Newman, Howard Elliott Reidbord, Daniel Spiegel, Roger Delbert Sutton, Wen-

dell Evans Zehel.

The award was given to Undergraduate Richard V. McCloskey.

PI

—Emory University
Georgia and Agnes Scott College
Decatur, Georgia

President:

Vice Pres.:

Corr. Sec.:

Rec. Sec.:

Treas.:

Editor:

Council Rep.: Dr. W. B. Baker, Biology Dept.

Awards went to:
Undergraduate — Roy Gresham Clay, Jr.
Graduate — Anita Ilese Bolinger

RHO

—University of Illinois
Urbana, Illinois

President: Dr. Walter W. Heck, Radio Carbon Lab, 167 Davenport Hall
Vice Pres.: D. L. Richardson, 208 Natural History Bldg.

Corr. Sec.: Miss Barbara Howell, 406c Natural History Bldg.

Rec. Sec.:

Treas.: S. Fred Marotta, 401 Natural History Bldg.

Editor: Merle Mizell, Veterinary Medicine

Council Rep.: Prof. Norman D. Levine, 163 Veterinary Med. Bldg.

Rho presents its 1954-55 program Oct. 19, 1954, *Speaker:* Dr. F. R. Steggerda, (Physiology).

Subjects "Problems of Biological Interest in Peru at Sea Level and High Altitudes."

Time-Place: Tues., 7:30 P.M., in Nat. Hist.

Nov. 9, 1954, *Speaker:* Dr. Leland Shanor, (Botany).

Subject: "Fungi as the Cause of Human Diseases."

Time-Place: Tues., 7:30 P.M., in 229 Nat. Hist.

Dec. 13, 1954, *Speaker*: Dr. George W. White, (Geology).

Subject: "Geology and Natural History in the American Colonies."

Time-Place: Mon., 8:00 P.M. in 314 Illini Union.

Jan. 11, 1955, *Movies*: To be announced.

Time-Place: Tues., 7:30 P.M. in Nat. Hist.

Feb. 8, 1955, *Speaker*: Dr. John O. Corliss, (Zoology).

Subjects: "Evolution Among the Ciliated Protozoa."

Time-Place: Tues., 7:30 P.M. in Nat. Hist.

Mar. 8, 1955, *Speaker*: Dr. L. L. McQuitty, (Psychology).

Subject: "Objective Methods for Classifying People Into Types."

Time-Place: Tues., 7:30 P.M. in 229 Nat. Hist.

Apr. 13, 1955, *Speaker*: Dr. R. J. Jugenheimer, (Agronomy).

Subject: "Hybrid Corn Development in Europe and Mediterranean Countries."

Time-Place: Wed., 7:30 P.M. in 229 Nat. Hist.

May 10, 1955, *Speaker*: Dr. C. S. Vestling, (Biochemistry).

Subject: To be announced.

Time-Place: Tues., 8:00 P.M. in Faculty Lounge, Illini Union.

New Rhodians are: Clarence Bailey Ammerman, James Bond, Ruth Vinton Chalmers (Faculty), Kavi Chutikul, Carol Chapman Clevlen, Leroy Frank Davidson, Lee Evans, Fredrick Robert Fechtner, Dewitt Garrett, Jr., Robert Harry Gilpin, Roland R. Goin, John Karl Hoover, Cheng-Lee Lee (Faculty), James Byron Lovell, William Herbert Lowden, John Warren Matteson, Stanley Shoso Miyake, Harold Allen Moore, Lawrence Lipman Rosen, Louis Harold Schliselfeld, Amy Gage Skallerup (Faculty), Robert John Snetsinger, Vernon DeForest Stotts, Kenneth Ambrose Tabler, Robert Williams Tuveson, Wesley Cecil Whiteside, Stephen Morris Williams, Horne Richard Wong, Eugene Ellison

Aikman, Burdette Charles Breidenstein, Herschel Vincent Shirley, Jr., James Ray Stouffer, Florence Williams.

The following new officers for 1955-56 will be installed on May 10: John W. Matteson, president (Department of Entomology); Bert Babero, vice president (Department of Zoology); Leslie Swartz, corresponding secretary (Department of Zoology); Robert Claus, recording secretary (Department of Botany); William Zebrun, treasurer (Department of Zoology); Norman Biggs, editor (Department of Physiology).

Enclosed please find copies of our program for 1954-55 and some of the announcements of Phi Sigma lectures held on our campus.

Marle Mizell

Editor, Rho Chapter

SIGMA

—University of Florida
Gainesville, Florida

President: Claude T. Adams, Sr., Department of Biology

Vice Pres.: Paul J. Osborne, Department of Biology

Treas.: Robert Haubrich, Department of Biology

Rec. Sec.: Joseph M. Good, Department of Soils, College of Agriculture

Corr. Sec.: John Mullins, College of Pharmacy

Editor: Marjorie Newell, Cancer Research Laboratory

On the night of January 7, 1955, Sigma Chapter held its initiation for the Fall Semester 1954-55. Twenty-eight candidates, representing twelve departments, were initiated. These were Walter Auffenberg, Edwin M. Banks, Frederick H. Berry, John C. Briggs (Faculty), Ruth D. Bronsweig, Hal D. Brown, Pedro Canales-Villar, Jacob O. Cohen, Charles F. Eno (Faculty), Aroldo Frenzel, Stewart W. Freyburger, Leroy W. Haines, Arch D. Hart, Thomas R.

Hellier, Jr., Hallock Jay Hosford (initiated by proxy), John F. Howell, James B. Lackey (Faculty), John I. McKigney, Lee D. Olinger, Jason C. Outler, Jr., Cleston G. Parris, Donald F. Rothwell (Faculty), Bette Ann Starnier, Ann Rita Stasch, Cleo D. Wilder, Jr., James L. Yount (Faculty), and Janice E. Zeman. At the close of the initiation ceremonies, Dr. H. K. Wallace, secretary of Sigma 1926-27, gave a brief resume of the history of Sigma Chapter from its installation to date, naming some of our outstanding alumni.

Following the ceremonies, the initiates were feted in accustomed style. Sigma was honored to have as its guest speaker the newly elected National Vice President of Phi Sigma, Dr. Samuel L. Meyer, director of the Oceanographic Institute, Florida State University, Tallahassee, Florida. Dr. Meyer delivered a most inspiring talk entitled "The Sons of Science," a very appropriate topic for such an occasion.

HALLOCK JAY HOSFORD

1929-1955, *An Obituary*

Hallock Jay Hosford was born April 12, 1929 at Chicago, Illinois. He was the son of Mr. and Mrs. H. C. Hosford of Wilmington, Delaware. He received his early training at Roosevelt High School, East Chicago, Illinois, graduating in 1947. After graduation, he attended Purdue University, Lafayette, Indiana, where he received his degree of Bachelor of Science in 1951. During this time he developed a deep interest in the fields of Ecology and Wildlife Management. After graduation from Purdue University, he entered graduate school at the University of Wisconsin, but was forced to withdraw immediately due to ill health. He entered graduate school at the University of Florida in September 1952. Here he completed his curriculum for the degree of Master of Science in Wildlife Management, and expected to receive his degree in June 1955. His deep interest

in his chosen field was apparent in the sincere manner in which he carried out his research. His work at Purdue dealt with the ecology of the mourning dove in Indiana. His current research was centered around a study of the food habits of the Florida duck. He was a member of Xi Sigma Pi, Honorary Forestry Society, and of the Wildlife Society of America. He was initiated into Sigma Chapter of Phi Sigma Biological Society, by proxy, on January 7, 1955, one month before his untimely death.

Dated May 6, 1955: Charles Henry Barnes, John Acosta Black, Charles William Blissitt, Jesse Roy Christie (Faculty), Burie Webster Clements, Jr., Dennis Henry Cox, Albert Nelson Davis, Jr., Paul Harrison Everett, Charles Jerry Flora, Charles McHatton Fuss, Jr., Larry Gillespie, Charles Edward Haines, William Henry Hubbard, Byron Harry Knapp, III, Elsie Wattie Lackey, Joseph Anthony Liuzzo, William Edward Page, Harry Franklin Roberts, Beth Schultz, Anilkumar Amratlal Sheth, Claude Larry Thomasson, Tomas Vilanova, Howard B. Young.

UPSILON

—Miami University
Oxford, Ohio

President: L. Barrie Hunt, Phi Kappa
Tau House

Vice Pres.: Miss Elizabeth Ann Kautz,
309 Hamilton Hall

Corr. Sec.: Russell G. Barnekow, 141
Ogden Hall

Rec. Sec.:

Treas.: John E. Ebinger, S4 Miami
Lodges

Editor: Miss Mary Louise Hess, 300
Hamilton Hall

Council Rep.: Prof. David W. Bergstrom, Zoology Dept.

Dated December 16, 1954, the following became members: Michael Bilitch, Ronald Raymond Gauch, Robert Carlson Hauver, Joan Fisher

Hundley, C. Alan Linn, Jerome Philip Miksche, Mary Elnora Newman, Charles Henry Thompson and Robert C. Winslow.

On May 5, 1955, the following were initiated: Ronald Alan Andree, Joyce Lee Bowling, John F. Brandts, Carol Mae Crumbaker, Ruth Nina Dunn, Roderick J. Hinshaw, Richard Thomas Moore, Mark Millikin Ross, Joseph Bernard Schleicher, David Alan Wakefield.

Miami University gave 1955 awards to:
Undergraduate — Lawrence B. Hunt
Graduate — Michael Bilitch

PHI

—University of New Hampshire
Durham, New Hampshire

President: Kenneth Hildreth, Zoology Dept., Nesmith Hall

Vice Pres.: Miss Joanne Van Dyk, Zoology Dept., Nesmith Hall

Corr. Sec.: Miss Joan McTerney, Chi Omega, Durham, N. H.

Rec. Sec.:

Treas.: Garry Moushegian, Dept. of Zoology, Nesmith Hall

Editor:

Council Rep.: Dr. A. R. Hodgdon, Botany Dept.

Initiates for Phi Chapter, dated December 8, 1954: Harold Cornelius Albin, Jr., Peter Herbert Allen, Cowan Brenton Battersby, Randolph C. Blodgett, Jr., Frank William Calder, Theodore Miller Cole, Ronald Barnard Davis, Gerald Martin Dunn, James Romeo Duval, Alan Theodore Engle, Bernard Fried, Robert William Hanks, Robert William Langlois, Alan Irving Marston, Nancy Jean McDaniel, William Wendell Oliver, Everett William Parhiala, William Talbot Pike, David Rosi, Kenneth Smith, Jr., Karl Foster Strong, Martin Alstyne Townseld, Gino Angelo Trevisani, Phyllis Ann Wechezak, Robert Oliver Wilkins, Audra Mae Williams and William Daren Zeedyk.

CHI

—Montana State College
Bozeman, Montana

President: Miss Johnna Lee Haas, 503 West Cleveland, Bozeman

Vice Pres.: Stanley Yamamoto, 606 West Olive St., Bozeman

Corr. and Rec. Sec.: Miss Vera Stucky, Dept. of Botany and Bacteriology

Treas.: Don Kenzcka, 13 "A" St., Bozeman

Editor:

Council Rep.: Dr. Mitrofan Afanasiev, Dept. of Botany and Bacteriology

On November 17, 1954, the following entered Phi Sigma: Richard Leif Fredericks, Richard Charles Froeschner (Faculty), Marian Lucille Hookham, Dorothy Ann Iverson, Kiyoe Louise Kotaki, Mary Cornelia Parker, Charles Chang-chi Sih, Kathleen Kiichli.

The awards went to:

Graduate — Charles J. Sih

Graduate — Glen F. Cole

PSI

—University of Washington
Seattle, Washington

President: Leo Parks, Microbiology

Vice Pres.: Fred Leslie Clogston, Zoology Dept.

Corr. Sec.: Mrs. Lois Foster, Oceanography

Rec. Sec.: Miss Lucille Steelman, Anthropology

Treas.: Terry Buckridge, Fisheries

Editor: Mrs. Lois Foster, G 511 Health Sci. Bldg., Anatomy Dept.

Council Rep.: Dr. Mellville Hatch, Zoology Dept.

On March 3, 1955 the following joined Phi Sigma: Richard Lee Anderson, James Wendell Lorbeer, Charles Wassberg, Robert Allen Olsen, Dorothy I. Cramer, Richard Alexander Levin, Neil G. McCormick, Leone Stafne St. Vincent, Phyllis Deen Rowe, Betty Jean Kault, Joseph Lester Taylor, Stanley William Strunk,

Lorraine Marie Pilon, Frank Frederick Fullington, Freeman Richard Stephens, Phillip Earl Seelinger, James Frank Hebard, Alceita C. Gilbert, Mary Ladell Tackett, Robert Emmett Booher, Evelynne Jean Hanson, James M. Trappe, Raymond A. Arzylowiez, Deb Menasveta, Richard Holmes Hevly, Richard Gerard Van Dyke, Robert Fenton Elwell.

OMEGA

—University of Oklahoma
Norman Oklahoma

President:

Vice Pres.:

Corr. Sec.:

Rec. Sec.:

Treas.:

Editor:

Council Rep.: Dr. Paul R. David, Zoology Dept.

May 4, 1955 witnessed the initiation of: Donald Henry Baepler, Clarence L. Baugh, Jr., Cecil Jackson Bennett, Katherine Wilson Bennett, Horace Jack Brown, Peter Lee Cason, Clint E. Chambers, John Kent Chesnut, Verdine Mae Conley, Betty Alice Cooper, Ronald Earl Elkin, Jr., Janice Kay Frady, Joe Charles Finnell, Mark Elias Gutzke, Gary Gordon Hays, Lothar Edward Hornuff, Jr., Samuel Wilford Jackson, Jr., Charles Hawkes Johnson, Ann Kirkpatrick, James Harvey Lindsey, James M. G. McConathy, H. A. McIntosh, Mary Kay McShane, Marilyn Elizabeth Moody, Claude Nations, Jr., Donald Richard Pfeifer, Audrey Fern Pospel, Betty Jean Powers, Gerbert Charles Rebell (Faculty), Donald Ray Resler, David Dean Rose, Vivian Moon Sanford, Gloria Ardell Schlesinger, Vernon E. Scholes, Robert Andrew Stevens, Sandra Waite Stippich, Kenneth G. Wanzor and Paula Prall White.

The awards were given to:

Undergraduate — Margaret Wilson Roberts

Graduate — Edwin F. Alder

ALPHA ALPHA

—University of Southern California
Los Angeles, California

President: Herman Ainis, Dept. of Bacteriology

Vice Pres.: Nathan Basson, Dept. of Bacteriology

Corr. Sec.: Miss Martha Jane Belknap, Dept. of Bacteriology

Rec. Sec.:

Treas.:

Editor: Nathan Basson

Council Rep.: Dr. W. V. Mayer, Dept. of Zoology

At the University of Southern California the Sigma awards went to:
Undergraduate — Marilyn R. Mansfield

Graduate — William John McCauley

ALPHA BETA

—Mount Union College
Alliance, Ohio

President: George W. Bowersock, West Kentucky Ave., Sebring, Ohio

Vice Pres.: James Mottice, 539 Edwards St., Louisville, Ohio

Corr. Sec.: Miss Joan Moreland, 2542 Ridgewood, Alliance, Ohio

Rec. Sec.:

Treas.:

Editor:

Council Rep.: Prof. O. H. Engle, Dept. of Biology

On January 18, these students entered Phi Sigma: Edwin Dale Bowers, Jean Louise Dietrich, Robert Scott Kunkel, Joshua Adeniran Odetoyinbo, Chudomir George Popoff, Albert Adepoju Salako, Richard Henry Untch, Thomas Edward Violand, Walter Norman Webb, Mary Renkert Wendling.

Award went to: Undergraduate — George W. Bowersock.

ALPHA EPSILON

—University of Pittsburgh
Pittsburgh 13, Pennsylvania

President: Grant Doering
Vice Pres.: Brother Robert Schullein
Corr. Sec.: Joseph Sunder
Rec. Sec.: Walter Donnellan
Editor: Dr. Clem Russ
Council Rep.: Dr. Peter Gray, Dept.
of Biological Sciences

ALPHA ETA

—Oklahoma A. & M.
Stillwater, Oklahoma

President: John Kind, 142 Brumbley,
Stillwater, Okla.
Vice Pres.: Daneil Russell, 311 N.
Duncan, Stillwater, Okla.
Corr. Sec.: Miss Rosemary Ben Atkin-
son, 619 College Ave., Stillwater
Rec. Sec.:
Treas.: Sadrek Ayaub, 402 Cordell
H., Oklahoma A. & M.
Editor:
Council Rep.: Dean C. H. McElroy,
School of Vet. Medicine

Initiates for Alpha Eta Chapter,
dated January 9, 1955: Vincent
Frank Altieri, Jane Ann Avery,
Franklin Delano Baker, William Le-
roy Baker, Orville Dean Ball, Charles
William Basham, John Beavers, Betty
Jo Benton, Edward L. Blevins (Fac-
ulty), Gene Paul Carpenter, Stedman
Hall Carr, Herschel Dean Claxton,
John Williamson Davis, Jr., Paul E.
Degurse, Frank R. Elmore, Talmage
Leroy Figart, Jr., Jonathan D. Friend
(Faculty), Randle E. Furr, James O.
Gibson, Jr., Orville Dean Grossarth,
John Gordon Hall, Sess D. Hensley,
Mary Ann Hill, Gilford John Iken-
berry, Jr., Lester Johnson (Faculty),
Mary Carol Jordan, Robert Adams
Kainer (Faculty), Thomas Robert
Lathan, William Walter Leatherwood,
Eliase Lucia Mahlstedt, Norbert Paul
Neumann, Carroll D. Olson, Marion
Jake Owen, Harold D. Powers, Wal-
ter M. Rice (Faculty), Ella Florence
Schmidt, Leon Clark Self, Gwendolyn

Ann Slover, Clarence Andrew Storie,
Eddie Lee Thomason, Jr., Gus Wol-
lard Thornton, J. D. Wallace, Lorena
Mitzi Walsh, Warren J. Ward, Jr.,
Lloyd Charles Weldon, James Berry
Wise, Robert Marion Yates, Roger
Neil Zachritz.

April 17, 1955 saw these enter:
Charles Lindbergh Alexander, Barbara
A. Everhart, Jack Lyndale Griffith,
Ansel L. Hull, Shue Lock Lam (Fac-
ulty), Theodore Alferd Long, Joe
Phillip McClure, Phyllis Louise Por-
ter, Martha Puckett, Donald Gene
Randolph, Nancy Ann Robinson,
Tom Arthur Saunders, Robert J.
Shepherd, Gaylord Leroy Thorne,
Helen Jo Toma, Adeline Verzosa
Torrijos.

ALPHA IOTA

—Bucknell University
Lewisburg, Pennsylvania

President: Miss Norma Lou Skow,
Box W 283, Bucknell University
Vice Pres.: Miss Martha J. Roberts,
Box W 226, Bucknell University
Corr. Sec.: Miss Catherine Peter, Box
W 361, Bucknell University
Rec. Sec.:
Treas.:
Editor:
Council Rep.: Prof. Roy C. Tasker,
Biology Dept.

New members dated January 26,
1955: Thomas Jackson Cook, Eliza-
beth Hiester Jones, Meldrum Barnett
Winstead, Jr. (Faculty).

ALPHA KAPPA

—Hunter College
695 Park Ave.
New York 21, N. Y.

President: Miss Jo-Anne Badami,
4365 Grave Ave., Bronx 66, N. Y.
Vice Pres.: Miss Harriet Entih, 98
Van Courtland Park South, Bronx
63, N. Y.
Corr. Sec.: Miss Rosalie Hait, 1212
Lydig Ave., Bronx 68, N. Y.
Rec. Sec.:

Treasurer: Miss Selma Moskowitz,
2158 Mapes Ave., Bronx 60, N.Y.

Editor:

Council Rep.: Dr. Harold H. Clum,
Biology Dept.

The Alpha Kappa Chapter of Phi Sigma held its initiation on January 4, 1955. At the initiation dinner Father Berger of Fordham University lectured on "Changes in Choromosome Number during Development." The names of those initiated are: Josephine Lucarille, Joan Meyers, Sylvia Newman, Mary Payne and Inga Silberberg.

In the spring of 1954 Joan Meyers and Joanne Badami presented a discussion and demonstration of a three-dimensional cardboard model of the central nervous system at the Eastern College Science Conference at Brooklyn College.

ALPHA LAMBDA

—University of Utah
Salt Lake City, Utah

President: Gerald D. Brooks, 1175 E.
2nd St. South

Vice Pres.: John C. Frandsen, 342
Douglas St.

Corr. Sec.: Miss Sandra Shuler, 434
So. 13th East

Rec. Sec.:

Treas.: David W. Newman, 465 So.
12th East

Editor:

Council Rep.: Dr. Stephen D. Dur-
rant, 1381 So. 10th East, Salt Lake
City, Utah

Awards were given to:

Undergraduate — David William
Newman

Graduate — Merlin Raymond Lee

ALPHA MU

—Oregon State College

President: Cyrus McKell, Botany
Dept.

Vice Pres.: Brian McNab, Zoology
Dept.

Sec.: Allan Steinhauer, Entomology

Dept.

Treas.: Stanley Wilkes, Zoology Dept.

Editor: Norman Goetze, Farm Crops
Dept.

Corr. Sec.: Rod V. Frakes, Farm
Crops Dept.

Advisor: Dr. Ivan Pratt, Zoology
Dept.

Forty students and five faculty members were initiated. At the Initiation Banquet, a number of faculty members from the University of Oregon were present as guests. Student initiates were: Rodney Frakes, Warren Adlerz, Brent Horn, Dale Becker, Thomas Little, Thomas Colasuonno, John Bali, William Cram, Lowell Bell, Albert Forbes, Paul Benadik, Edward Ransen, Bonnie Busch, Lawrence Huber, Frank Conklin, Elbert Johnston, Don Edwards, Eugene Kauffman, Elizabeth Edwards, Orra Kerns, Beverly Folston, Robert Knight, Margaret Garner, DeVon Linn, Kenneth Goeden, Lindsay Loring, Brian McNab, William McCaleb, Donald Sump, Herbert Meeker, Marvin Young, Roger Skaar, Allen Steinhauer, Roger Vonderstrasse, Donald Tibbits, Robert Wheeler, Tom Veblen, Stanley Wilkes and Alexander Yusha.

Awards were given to:

Undergraduate — Robert Emmett
Hughes, Jr.

Graduate — Helge Irgens-Moller

The year was started with an outdoor picnic, with approximately 200 in attendance, and the close of the academic year was met with the same type of gathering.

Francis Duryee received a Fullbright Fellowship to study in the Department of Bacteriology at Tubingen, Germany.

Dexter Rogers finished his requirements for a Ph.D. at Oregon State College and was awarded a post doctoral fellowship to continue his study at Stanford University.

The Phi Sigma awards for 1954 were presented to Brian McNab, '54, and Albert Forbes, grad. Brian is a major in Zoology and expects to do



graduate work in the coming year. Albert is from the University of British Columbia and is doing graduate work in Entomology. Dean F. A. Gillfillan of the School of Science, Oregon State College, presented the awards. (See accompanying photograph)

Phi Sigma affairs for the school year 1954-55 got off to a good start at the first chapter meeting on October 26. The chapter heard a report from Nathan Cohen, our delegate to the National Convention at Miami, Fla. With his advice concerning submission of news to the *Biologist*, a special effort is hereby being made to bring our reports of chapter activities up to date. The program committee, composed of chapter President Cyrus M. McKell, Advisor Dr. Ivan Pratt, and Corresponding Secretary Rod Frakes, outlined the following speakers and subjects for the coming year:

November: Dr. Jerome C. R. Li, Math Department. Subject: "Biometrics as a Research Tool for Biologists." Dr. Li's latest book is in the hands of the publisher and is expected to be available in the near future.

January: Dr. Lewis F. Roth, Botany Department. Subject: "Some Basic Problems in Forest Pathology".

February: Dr. K. Stephen Pilcher, Bacteriology Department. Subject: "Problems Encountered in the Early Development of Penicillin".

March: Dr. Paul E. Bernier, Poultry Department. Subject: "Physiology in Population Genetics".

April: Initiation Banquet. Speaker will be Dr. Bradley Sheer of the University of Oregon Biology Department. Subject: "Ion Transfer Across Cell Membranes".

May: Spring picnic. To be planned by new and old executive committees.

Other new members are: Sherl Melvin Dietz (Faculty) and Otto Christian Nelson.

ALPHA NU

—University of New Mexico
Albuquerque, New Mexico

President: Harold George Scott, Dept. of Biology

Vice Pres.: Chester R. Richmond, Dept. of Biology

Corr. Sec.: Miss Valerie Ernst, Dept. of Biology

Rec. Sec.: Miss Edith Bratton, Dept. of Biology

Treas.: Miss Winnefred Matthews, Dept. of Biology

Editor: Miss Virginia Avis, Dept. of Biology

Council Rep.: Dr. Edward F. Castetter, Dept. of Biology

Alpha Nu Chapter initiated on February 3, 1955: Bettie Allen Brockman, Suzanne Carson, Julia Blaine Clark, John P. DeVanzo, William Carter Doyle, Jr., Dorothy Madge Lewis, Barry Eugene Pullen, Berna Emma Romero.

Gave awards to:
Undergraduate — Larry W. White
Graduate — Harold G. Scott

ALPHA XI

—University of Rhode Island
Kingston, Rhode Island

President: Theodore Smayda, Marine Biological Lab.

Vice Pres.: Earle Travis

Corr. Sec.: Alan Hunter

Rec. Sec.: Miss Barbara Bowers

Treas.: Richard Boyle

Editor: Edward Tillinghast

Council Rep.: Prof. Robert R. DeWolf, Zoology Dept.

ALPHA OMICRON
—Marquette University
Milwaukee, Wisconsin

President: Robert J. Kinney, 2905 W. Wisconsin Ave., Apt. 906, Milwaukee

Vice Pres.: John Mittelstaedt, 3743 N. 41st St., Milwaukee

Corr. Sec.: Miss Helen Wood, Biology Dept. Marquette University

Rec. Sec.: Miss Jacqueline Garner, Biology Dept., Marquette University

Treas.: Richard J. Vogl, 2417 N. 38th St., Milwaukee

Editor:

Council Rep.: Dr. James Barrett, Biology Dept., Marquette University, Milwaukee, Wis.

We are pleased to announce that our first issue of the *Newsletter* was something of a mild success. The number of kind letters and postcards to the Editor was really overwhelming and we are most grateful for the advice and the congratulations. It is still our purpose to effectively disseminate news and items of interest to the membership of the Chapter, and thus we repeat our plea to you, that the individual members feel the obligation to supply us with the notice of their doings.

Initiation of New Members

The annual Christmas party served as the scene for the initiation of seven new members into the ranks of the Alpha Omicron Chapter. Election of the candidates to membership had taken place at the October meeting, and their names and qualifications duly submitted to the National Chapter. In the course of the solemn Initiation Instruction the following individuals were admitted:

Ariel Bar-Sela, graduate student; Alan Becker, junior; Lee Gimler, senior; Ernest Harris, graduate; Wilfred Man, senior; Marianne Schaaf, instructor; and Patricia Wroblewski, junior.

Congratulations! Welcome to Phi Sigma, from all of us at Alpha Omicron!

Two Phi Sigma's, Lou Pierro and Glenn Essenther, were visitors to the Chapter during the recent holidays. Lou is currently teaching in the Department of Zoology at Xavier University.

Dr. Ewart G. Bertram of the Marquette Medical School Department of Anatomy, spoke at the November 16 meeting of Phi Sigma. His topic was: "The Morphology of Somatic Cells According to Sex." The subject was pertinent to the work of Barr and Bertram, who in 1949 discovered a morphological difference in nerve cells according to sex. This distinguishing feature in the cells was a tiny body approximately one mu in diameter, located in the nucleoplasm immediately adjacent to the nucleolus. Dr. Bertram's statistics showed that this body, sometimes termed the "nucleolar satellite", was found to be present in 80-90% of the tissues examined from females and in 3-5% of the tissues examined from males. Further studies into this "sex characteristic" revealed its presence in skeletal, smooth, and cardiac muscle, cartilage, epithelium of the G.I. tract, skin, thyroid, and urinary bladder.

One of the many applications, according to Dr. Bertram, is the proper classification of hermaphrodites. A simple skin biopsy from the genitalia of the newborn determines whether is male or female.

Phi Sigma's annual Christmas party was aided and abetted by the presence of Dr. Murl Deusing and his film: "The Everglades". The traveling camera of this accomplished photographer entertained as well as educated those present in Seminole Indian culture, and the wildlife and ecology of the southern grasslands. Mr. Deusing's delightful narrative and pictures were enough to make a naturalist green with envy, and his association with the Milwaukee Public Museum and his creative part in such wildlife productions of Walt Disney as, "Nature's Half Acre", "Beaver Valley", and the recent "Vanishing Prairie"

are adequate explanations of his knack for catching the flavor of life in the wilds.

A word of mention is in order for the Program committee which so ably made the arrangements for the Christmas party. Bob Fabiny, as chairman, saw to the rental of the modern Mitchell Park Fieldhouse and supervised the layout and buffet luncheon served. Committee members were: Irene Minick, John Bamrick and Vitrude DeSpain. They rightly deserve bravo's.

Phi Sigma Awards

On Tuesday, December 14, at the Christmas party, the annual Phi Sigma medals were awarded. Actually certificates, the recipients were Robert Kinney (for the Undergrad award) and Sister M. Imeldis (the Graduate award). Our congratulations to them both!

Daniel M. Benjamin sends word that on February 1, 1954, he resigned his position of Entomologist with the U. S. Forest Service, and has accepted the position of Assistant Professor of Entomology at the University of Wisconsin.

We're glad to say that R. E. Esser is self-avowedly a busy man. In a note to the Editor he says that he is living the "life of a country squire" on a 12 acre farm, west of Racine, Wisconsin.

It was very nice hearing from Sister Mary Albertine, O.P., who has recently been appointed Science Coordinator for the schools conducted by the Dominican Sisters of the Congregation of St. Thomas Aquinas. She tells us that one of her "pet projects" is the teaching of science workshops in the summer sessions, to both parochial and public school elementary grade teachers. The object of such a program, she feels, is to awaken interest in the sciences and so pave the way for better high school and college science students. We wish her the very best success in the years to come.

Dr. Sheldon Barrett, M.D., has

written that for the next two years and a half he will be a resident in dermatology at the Cincinnati General Hospital.

A card from Mr. and Mrs. Paul Urso informs us that Irene is currently a histologist in neuropathology at the Radiation Branch, Cancer Institute, National Institute of Health, Bethesda, Md.

Old Phi Sigmer, Walt Gojmerac, writes that he is currently finishing up the work for a doctorate in the Department of Entomology at the University of Wisconsin. His research project is concerned with factors affecting the biology of cattle lice (*Bovicola bovis*).

Since one of the aims of our Society is to foster undergraduate research, it is only fitting that we report from time to time on the various projects being investigated by University undergrads, with the direction of their faculty advisor. President of the Alpha Omicron Chapter, Bob Kinney, is currently employed with a series of crosses to determine the inheritance of albinism (coat color) in the hamster. According to known records, the trait for albinism first occurred in Milwaukee in February, 1950, under chance circumstances. The animals were first discovered wild in Syria in 1930, all descendants coming from one female and her offspring. Up until the mutant appeared the coat color of the animals had been remarkably uniform in appearance and the first recorded mutation, although not albinism, was recorded in 1947. Working with Dr. Peloquin, Bob will try to trace the trait.

The 1955 Phi Sigma lecture will be given Sunday, March 27, by Dr. Isidore Gersh, Professor of Anatomy, University of Chicago School of Medicine. Dr. Gersh, who is internationally recognized as an authority on the freezing-drying method of tissue preparation, will deliver an illustrated address entitled, "Sub-microscopic Morphology and Cytochemistry of Frozen-dried Liver Cells Studied with the

Electron Microscope." This topic comes as the result of two years on intensive research on the subject and marks the first public presentation of the results. The lecture will be held in Room 116 of the Business Administration Building on the Marquette campus, and all interested are invited to attend. It will start at 3 p.m. and the admission is free.

Our featured speaker at the regular February monthly meeting was Mr. Eugene Kitzke of the Johnson Wax Company. His topic was "Waxy Palms" and included an illustrated tour through Northeastern Brazil, where the company maintains experimental wax palm plantations. Specimens of the palm leaves, samples of the various grades of commercial wax, and a description of the methods of extracting the wax from the *Carnuba* made the talk an interesting addition to the series of monthly lectures. Mr. Kitzke is a member of Phi Sigma and resides in Milwaukee.

The annual Phi Sigma awards were also presented:

Undergraduate — Robert Kinney

Graduate — Sister M. Imeldis

On April 19, 1955, Alpha Omicron initiated: Ronald Edward Bowen, Joseph Arthur Fleckenstein, Irene Genean Gandini, William Jere Hansen, Joan Marie Karwowski, Mary Lou Lavan, Joseph Maynard Lehmkuhle, James Larence Martin, Raymond Thaddeus Snyder, Margaret Jacquelyn Tessaro, Thomas Grady Wygant, and Massis Yeterian.

ALPHA PI

—University of Colorado
Boulder, Colorado

President: Albert W. Johnson, 954

8th St., Boulder

Vice Pres.: Robert Higgins, 2404
Water, Boulder

Corr. Sec.: Miss Kathleen Beargle,
210 Arapahoe, Boulder

Rec. Sec.: Miss Arline Avrck, 1415
Broadway, Boulder

Treas.: Miss Deborah Merrill, 1025

15th St., Boulder

Editor:

Council Rep.: Dr. Edna Johnson,
Botany Dept.

Alpha Pi Chapter, on December 14, 1954, initiated: John Hodgen Brown, Joanne Chaniot, Kathryn Elizabeth Obergfell, Warren Lane Pancake and Arnold Silverman.

And on April 12, 1955, the following joined: Harry Blake Chappell, Alvin Mathews Earle, Laurent Osias Gaudreau, Marjorie Eckberg Masters, Eveline Elsa Schneeberger, Ronald Earl Smith, Havelock Thompson, Oakleigh Thorne, II, Donald Eugene Watson and Charles Hamilton Norris (faculty).

Awards went to:

Undergraduate—John Hodgen Brown
Graduate—Albert Willard Johnson

ALPHA RHO

—University of Arkansas
Fayetteville, Arkansas

President: Glen J. Dixon, Dept. of

Botany and Bacteriology

Vice Pres.: Billy G. Diggs

Corr. Sec.: John R. Bagby

Rec. Sec.:

Treas.: Shelby M. Smith

Editor:

Council Rep.: Dr. Delbert Swartz,
Dept. of Botany and Bacteriology

ALPHA UPSILON

—University of California at Los
Angeles

Los Angeles 24, California

President:

Vice Pres.:

Corr. Sec.:

Rec. Sec.:

Treas.:

Editor:

Council Rep.: Dr. Bernard O. Phinney, Dept. of Botany

ALPHA PHI

—College of Puget Sound
Tacoma, Washington

President: Charles C. Kruger, College

of Puget Sound
Vice Pres.: Mrs. Irene Creso, Spanaway, Washington
Corr. Sec.: Charles B. Arnold, Jr., College of Puget Sound
Rec. Sec.: Jack Cowan, 515 6th St. N. W., Puyallup, Washington
Treas.:
Editor:
Council Rep.: Dr. Gordon D. Alcorn, Biology Dept., College of Puget Sound

Initiates for Alpha Phi Chapter, dated January 6, 1955: Norman Roderick Anderson (faculty), Ruth Hadley Arnold, Ruth Jo-Anne Brown, Louella Marie Lowe, Gerald Irwin Murdock, Willis Edward Peacock and Virginia Roberta Weeks.

The award was made to: Undergraduate Charles Kruger.

ALPHA CHI

—University of the Philippines
 Quezon City, Philippines

President: Zenon Torres, Bureau of Fisheries, Manila

Vice Pres.: Joventino Soriano, Dept. of Botany, College of Liberal Arts, University of the Philippines

Corr. Sec.: Miss Fanny Cid, 338 Tennessee, Malat, Manila

Rec. Sec.: Miss Cecilia Vargas, Dept. of Botany, College of Liberal Arts, University of the Philippines

Treas.: Miss Nelia Salazar, Dept. of Zoology, College of Liberal Arts, University of the Philippines

Editor:

Council Rep.: Dr. Gregoric T. Velasquez, Dept. of Botany, College of Liberal Arts, University of the Philippines

Following are the new members of Phi Sigma: Fernando Apelo Barnardo, Valeriano C. Calma (faculty), Amado Campana Campos (faculty), Magdalena Solimon Chua, Conrado Dayrit (faculty), Peria Oreta Dizon, Rodolfo Mendiola Ela, Enrique Liwag Esquivel, Jr., Reuben Castro Guerrero, Emerita V. De Guzman (facul-

ty), Vincente Austria De Guzman, Jr., Antonio Carmelo De Leon, Jr., Gloria Alandy Lualhati, Miguel Manresa, Jr. (faculty), Elzer Blancaflor Medina (faculty), Angelita Rodriques Mendoza, Faustino T. Orillo (faculty), Alacia Remedios Paez, Juan V. Pancho (faculty), Elsa Cai-cetas Ramirez, Amelia Gestavu Reyes, Leo Caddac Rimando, Lourdes Baens Del Rosario, Mateo A. Sanchez, Antonio Victoria Santos, Marcelo Tangco (faculty), Getulia B. Viado (faculty), Nieva Espiritu Veloir, Benito Sibug Vergara, Leticia-Barbara Nejal Banez, Dioscoro Lopez Umali (faculty), Pedro G. Reguerzo (faculty), Leon G. Gonzales (faculty), Jose B. Uichanco (faculty) and Marcos Del Rosario Fojas.

ALPHA PSI

—Virginia Polytechnic Institute
 Blacksburg, Virginia

President: Paul H. Smith, Box 4194, Va. Tech. Station, Blacksburg, Va.

Vice Pres.: Edwin O. Willis, Box 6392, Va. Tech. Station, Blacksburg, Va.

Corr. Sec.: Warren H. Taylor, Box 5936, Va. Tech. Station, Blacksburg, Va.

Rec. Sec.: James R. Brennan, Box 3686, Va. Tech. Station, Blacksburg, Va.

Treas.: Charles B. Wood, Box 3642, Va. Tech. Station, Blacksburg, Va.

Editor: Floyd E. Jarvis, Box 4206, Va. Tech. Station, Blacksburg, Va.

Council Rep.: Dr. Kendall W. King, Dept. of Biology, V.P.I., Blacksburg, Va.

Awards were made to:
 Undergraduate—William B. Allison
 Graduate—John Hoover Hash

ALPHA OMEGA

—University of Georgia
 Athens, Georgia

President: Miss Mary Dunn, Biology Dept., University of Georgia

Vice Pres.: Robert Gibson, Biology

Dept., University of Georgia
Corr. Sec.: R. S. Bowersett, Veterinary School, University of Georgia
Rec. Sec.: Miss elen Jordan, Veterinary School, University of Georgia
Treas.: Fred Everhart, Veterinary School, University of Georgia

Editor:

Council Rep.: Dr. Donald Scott,
 Dept. of Biology, University of Georgia

Alpha Omega Chapter initiated on January 12, 1955: Agostino Carlucci, Fred Parker Chambless, Edith June DeZoort, John Benjamin Gentry, Everett Clark Kuglar, Jack Ira Lowe, Lynn Craven Marston, Robert Barclay McGhee (faculty), Thomas

Walker Monaghan, John Neil Parker, Leslie Ralph Poe, Jr., Charles Martin Speegle; and on April 27, 1955, the following: John Metcalf Bowen, Celia Ann Calloway, Clyde E. Connell, Jr., Edwin Leonard Everhart, William Ernest Gray, Jr., Marie Fleetwood Lanier, James Russell Lindsey, Robert Loomis Linkfield, James Max McEntyre, Birch Lee McMurray, Eugene Eaton Musselman, Jr., Florence Rachel Rose, Alfred E. Smalley, Eric Fontelle Thompson, Jr. and Richard Williams.

Awards were presented to:
 Undergraduate—Edith June DeZoort
 Graduate—Mary C. Dunn

WELCOME!

BETA ALPHA

Pennsylvania State College

State College, Pa.

Phi Sigma rejoices on 26 May at the installation of its
 49th Chapter. Vivat! Crescat! Floreat!

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Date _____

To: DR. F. S. ORCUTT

Executive Sec.-Treas.

Phi Sigma Society

P.O. Box 454

Blacksburg, Virginia

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DIRECTORY Of All Chapters

*Indicates Temporary Inactivity

*ALPHA—Ohio State University, Columbus, Ohio, 17 March 1915.

BETA—University of Michigan, Ann Arbor, Michigan, 3 June 1916.

*GAMMA—North Dakota Agricultural College, Fargo, North Dakota, (1916).

*DELTA—University of Maine, Orono, Maine, 27 January 1917.

EPSILON—University of Denver, Denver, Colorado, 5 March 1917.

ZETA—University of Wisconsin, Madison, Wisconsin, 30 May 1917.

ETA—University of Akron, Akron, Ohio, 20 April 1921.

*THETA—Michigan State College, Lansing, Michigan, 9 April 1921.

*IOTA—Washington University, St. Louis, Missouri, 28 May 1921.

KAPPA—University of Kansas, Lawrence, Kansas, 31 May 1921.

LAMBDA—University of Montana, Missoula, Montana, 4 May 1921.

*MU—University of California, Berkeley, California, 27 April 1922.

NU—Washington and Jefferson College, Washington, Pennsylvania, 11 May 1922.

*XI—University of Nebraska, Lincoln, Nebraska, 3 May 1924.

*OMICRON—University of North Dakota, Grand Forks, North Dakota, 26 May 1924.

PI—Emory University, Georgia, 3 January 1925.

RHO—University of Illinois, Urbana, Illinois, 23 March 1925.

SIGMA—University of Florida, Gainesville, Florida, 4 December 1925.

*TAU—Duke University, Durham, North Carolina, 4 March 1926.

UPSILON—Miami University, Oxford, Ohio, 7 May 1926.

PHI—University of New Hampshire, Durham, New Hampshire, 21 May 1926.

CHI—Montana State College, Bozeman, Montana, 11 February 1927.

PSI—University of Washington, Seattle, Washington, 7 April 1928.

OMEGA—University of Oklahoma, Norman, Oklahoma, 24 March 1928.

ALPHA ALPHA—University of Southern California, Los Angeles, California, 17 May 1928.

ALPHA BETA—Mount Union College, Alliance, Ohio, 17 May 1928.

*ALPHA GAMMA—University of South Dakota, Vermillion, South Dakota, 15 May 1928.

*ALPHA DELTA—Lawrence College, Appleton, Wisconsin, 17 March 1929.

ALPHA EPSILON—University of Pittsburgh, Pittsburgh, Pennsylvania, 23 March 1929.

*ALPHA ZETA—College of William and Mary, Williamsburg, Virginia, 19 April 1930.

ALPHA ETA—Oklahoma Agricultural and Mining College, Stillwater, Oklahoma, 13 March 1930.

*ALPHA THETA—State College of Washington, Pullman, Washington, May 1930.

ALPHA IOTA—Bucknell University, Lewisburg, Pennsylvania, 9 January 1932.

ALPHA KAPPA—Hunter College, New York City, 8 January 1932.

ALPHA LAMBDA—University of Utah, Salt Lake City, Utah, 13 February 1932.

ALPHA MU—University and State College of Oregon, Eugene-Portland-Corvallis, Oregon, 18 November 1933.

ALPHA NU—University of New Mexico, Albuquerque, New Mexico, 21 April 1935.

ALPHA XI—University of Rhode Island, Kingston, Rhode Island, 17 May 1935.

ALPHA OMICRON—Marquette University, Milwaukee, Wisconsin, 18 June 1938.

ALPHA PI—University of Colorado, Boulder, Colorado, 24 May 1941.

ALPHA RHO—University of Arkansas, Fayetteville, Arkansas, 23 May 1945.

*ALPHA SIGMA—University of Texas, Austin, Texas, 2 February 1946.

*ALPHA TAU—National University of Mexico, Mexico, D.F., 7 April 1947.

ALPHA UPSILON—University of California at Los Angeles, California, 17 May 1947.

ALPHA PHI—College of Puget Sound, Tacoma, Washington, 28 February 1948.

ALPHA CHI—University of the Philippines, Manila, Luzon, P.I., 12 March 1949.

ALPHA PSI—Virginia Polytechnic Institute, Blacksburg, Virginia, 24 May 1949.

ALPHA OMEGA—University of Georgia, Athens, Georgia, 17 May 1951.

BETA ALPHA—Pennsylvania State College, Pennsylvania, 26 May 1955.

PHI SIGMA BIOLOGICAL HONOR SOCIETY

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THE BIOLOGIST

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EDITOR:

Dr. Anselm M. Keefe, St. Norbert College, West De Pere, Wisconsin

MILE POSTS

- 1915 March 17, Alpha Chapter organized, Ohio State University, Columbus.
- 1916 May, Central Governing Body organized, **BIOLOGIST** first issued.
- 1924 December, First National Meeting, Constitution revised, Washington, D. C.
- 1925 December, Second National Meeting, First Science Program, Kansas City.
- 1928 December, Fourth National Meeting, Coat-of-Arms adopted, Fourth Science Program, New York.
- 1930 January, Council Meeting, Ritual Revised, Norman, Okla.
- 1931 Phi Sigma Letters Registered, U. S. Patent Office.
- 1939 December, Ninth National Meeting, Tenth Science Program, Silver Anniversary, Ohio State University, Columbus.
- 1949 February, Joins the **ASSOCIATION OF COLLEGE HONOR SOCIETIES**.
- 1954 September, Fifteenth Meeting, Gainesville, Fla.

"The object of Phi Sigma is to promote interest in biological research. Although always designated as an honorary biological research society, it should be considered as a working guild of biologists interested in research. In effect, election to Phi Sigma should be an opportunity for better work, rather than merely election to an honorary society."